EDITORIAL

WOODEN ships seem to be one of the things of which there is a plentiful supply. The United States Shipping Board has 285 of them, including unfinished hulls, all of which it would like to sell. In this connection it is interesting to note that several wooden vessels of the Shipping Board designs have been remodeled and rigged as sailing-vessels, most of them barkentines, and are now giving satisfaction in the Pacific trade mainly as lumber carriers.

PREFERENTIAL freight-rates on exports and imports west of Chicago went into effect on October 23. Establishment of similar rates east of Chicago will be deferred until New England and other Eastern railroads can come to an agreement. The reductions are made in order to encourage the routing of trade with the Orient through Pacific instead of Atlantic ports, and are said to be particularly favorable to steel shipments. The new export rate is $14.20 per ton for the rail part of the journey, against the former rate of $16. The rate prior to the blanket increases of August 26, which affected all transportation, was $12 per ton.

SAN FRANCISCO stands sixth among the ports of the United States in tonnage, both export and import, handled by Shipping Board vessels, and leads all Pacific ports, according to statistics recently published covering the fiscal year ended June 30, 1920. Ranking San Francisco in importance were New York, Baltimore, Philadelphia, New Orleans, and Norfolk, in the order named. The total Shipping Board tonnage for all ports was slightly in excess of 20,000,000, of which San Francisco is credited with 1,042,811. Other leading Pacific ports report the following: Seattle, 679,558; Portland, 262,243; and Los Angeles, 131,177 tons. The figures for Shipping Board tonnage, of course, do not necessarily indicate rank in total commerce.

ONE cause for the inefficiency of Government operation is illustrated by the appointments recently made to the United States Shipping Board. Theodore Marburg is a publicist and was minister to Belgium for a few months immediately preceding Wilson's first inauguration. Frederic L. Thompson is the editor of the Mobile 'Register', and has been in newspaper or advertising work all his life. Gavin McNab, as most of our readers know, is an able lawyer and astute politician of San Francisco. Nobody seems to know much about Martin Gillen, the fourth appointee, except that he comes from Wisconsin, not necessarily a disqualification, in spite of Berger and LaFollette. Mr. McNab has declined to serve, but there seems to be little likelihood that a man better qualified will be appointed in his place. All these gentlemen are doubtless worthy men, with abilities along certain lines, but it is hardly conceivable that a private corporation doing a business of the same magnitude as the Shipping Board would have one man, let alone four, with as little training and experience along its special lines.

'BORING from within' the American Federation of Labor appears to be pretty much of a failure, judging from the recent official statement signed by Mr. Samuel Gompers and Mr. Matthew Woll, repudiating the present trend of the British labor movement, and declaring its lack of sympathy with the policies of the International Federation of Trades Unions. The British Labor Party has shown sympathy with Bolshevism, which has been expressed in many ways, particularly when protests were voiced against the British government sending aid to Poland, when aid was sorely needed. The coal strike, still unsettled at this writing, is another evidence that British Labor has lost its sense of proportion. This sort of thing does not appeal to the American unionist.

THE establishment of two factories of considerable size at San Jose, as recorded in our news columns, calls attention anew to the decentralization that is taking place in the metal industries in California. A man does not have to be very old or very long a resident of the State to remember when the manufacturing shops in northern California outside of San Francisco were few and far between. Even the development of the East Bay district in this respect has been comparatively recent. The two factories mentioned will bring the number of employees in manufacturing shops in San Jose considerably above 1000. Stockton metal factories employ in the neighborhood of 3000 men. Besides the railroad shops, Sacramento has various commercial plants, while Fresno, Visalia, Marysville, Lodi, Petaluma, and several other towns are also represented. From a narrow viewpoint, the development of the shops in the smaller cities might be regretted by the men in the metropolitan districts, but surely this is a mistake. Whatever benefits the smaller centres must in the end benefit the Bay and Los Angeles districts as well, even if occasionally a job stays at home that might otherwise have gone to the shop in the large city. More mechanics come to the State, increasing the total labor supply. The demand not only for machine-tools, but also for other supplies is increased. All this reacts to the benefit, not only of business in general in the metropolitan centre, but also of the metal trades.

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Retain Red Cross Membership

The Fourth Red Cross Roll Call comes this month, from the 11th to the 25th. The need of this organization is perhaps not so apparent as it was in the days when we were really as well as nominally at war. Yet the actual need is nearly if not quite as great, great enough anyway so that no one can afford to neglect to have some part in the work that the Red Cross is doing both at home and abroad, work that no other organization can do as well. Don't fail to renew your Red Cross membership, and if, by some odd chance, you are not a member already, be sure to avail yourself of the opportunity to become one.

Easy Come and Easy Go

A large part of the American people seem, during the year 1919 at least, to have adopted the viewpoint of the man that said he could get along without the necessities of life if somebody would only give him the luxuries. Internal revenue returns for that year, for the class of imposts commonly known as the 'luxury taxes', indicate that the public as a whole spent $350,000,000 for soft drinks, $50,000,000 for chewing gum, $2,110,000,000 for tobacco, $500,000,000 for jewelry, $300,000,000 for furs, $2,000,000,000 for automobiles, $750,000,000 for cosmetics and perfumery, $350,000,000 for cakes and confections, $3,000,000,000 for amusements, $3,000,000,000 for luxurious attendance and services, and $5,000,000,000 for luxurious food. The grand total is over $200 for every man, woman, and child in the United States. Some of these so-called luxuries, many of the automobiles, for instance, were really necessities for the particular purchaser, while most of them are legitimate objects of expense if the spender has the money. Nevertheless, the figures show that the Nation could tighten its belt considerably without damage, provided that it had to do so.

How to get the Closed Shop

In another column appears a discussion of 'Labor's Opportunity', written by a man well acquainted with the metal trades in California, who prefers to remain anonymous. His opinions deserve the careful consideration of everyone in the industry, whether employer or employee. In particular we would refer to his statements, first, that Labor needs salesmen, and, second, that such salesmen must handle a product and represent an organization that will make good. That there are advantages in the closed shop, just as there are in the inclusive employers' organization, cannot be denied. But the serious disadvantages in the closed shop are even more obvious. If Union Labor wants and is willing to sacrifice for the closed shop, let it see that every union man is an efficient workman, willing to deliver a day's work, and that every union organization keeps its agreements. Then there will be, perhaps not a nominal closed shop, but rather an actual and automatic closed shop, for few employers would go to the trouble of hiring non-union men if they knew that better production could be obtained by the employment of union members. To take a concrete instance: Does anyone suppose that the members of the California Metal Trades Association would have gone to the trouble and expense that they have during the past year to establish the open shop in this district if efficient workmen that would 'deliver the goods' could have been obtained from the unions? Labor unions in the metal trades have accomplished a great deal of good in the past, and, we believe, will accomplish a great deal of good in the future. At present, however, they are suffering from the mistakes of a relatively small part of their membership. The way back to a position of power and usefulness is going to be long. It is time that they started.

Going Down

Although prices of many commodities remain stationary, and some still continue to rise, the general trend is definitely downward. A contemporary observes that one encouraging sign is the resumption of eating-matches, such contests having been discontinued entirely during the period when food was at its highest. Even though the ultimate consumer is reaping little of the benefit as yet, the general outlook is good from the standpoint of the buyer. However, just as everyone is a buyer, so also everyone is a seller, whether it be of commodities or services. The desired deflation cannot be accomplished without hurting all the people some of the time and some of the people a good part of the time. Naturally business is not so 'good' as when practically the entire country was engaged in the delightful pastime of using its accumulating capital. There is some unemployment now and there is going to be more before the winter is over. But there is no reason to expect a panic, or even pronounced and continued depression. The crops were good, the transportation is better today than for several months, and is growing better all the time, while the underlying financial structure of the country is sound. Among the many evidences of this latter condition is the fact that the total amount of Liberty Bonds and Victory Notes held by the banks of the country has been reduced to approximately $1,000,000,000, while the amount of these securities held by the banks as collateral is also growing smaller, and is now little more than what might naturally be expected, considering the volume of the issues and their ready convertibility. The over-subscription of several recent offerings of standard securities indicates that there is plenty of money available in the country for legitimate needs. In fact, while the public appears to be 'fed up' on luxuries, the war-caused shortage of necessities is still unsatisfied in many lines. The metal trades, as producing mainly necessities, must benefit because of this condition. For example: In our news columns appears the statement by the general manager of a Californian power corporation that his company will, before

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the beginning of the 1921 pumping season, make extensions to furnish energy to more than 3000 prospective consumers, who have been on the waiting list until now because of lack of power. Three thousand complete pumping plants is a pretty big job itself, yet it represents only one power company, and only one of the needs for machinery of only one among the State's industries. Where do you get that 'hard times' stuff?

The Can Company Boycott

As a result of the general dispute between the International Union of Machinists and the American Can Company, the metal industries of the San Francisco Bay district are facing the most serious labor difficulty that has occurred since the big strike in the yards and shops was called off last June by the various unions affected. The trouble began in the Newark, New Jersey, plant of the Can company, and appears to have been caused by objection from the machinists' union to the bonus system that the company was trying to establish. A desire on the part of the machinists to unionize all the Can company's plants undoubtedly contributed. At any rate a strike was called in September by the International Union of Machinists in the Can company's plants throughout the country, including those in the Bay district, the machine-shop departments of which are in the California Metal Trades Association, and which have been running 'open'. In the local plants the strikers' places were filled without seriously interfering with the routine. Then the local Machinists' Union declared a boycott on Can company work, and its members in other shops refused to handle such work. Following this, on October 25, various members of the Metal Trades Association gave all machinists in their employ the alternative of signing an agreement to perform all work assigned to them, without discrimination, or else of being discharged. Up to the present writing, no union other than the machinists is involved, either in the original strike or in the local boycott. Nationally, the affair is a trial of strength between the machinists and the Can company. Locally, the Metal Trades Association is also involved. The machinists are using a favorite, and frequently effective, weapon of labor, the boycott. This, however, is a game at which two can play, and under present conditions, the Association is likely to be able to play longer than the Union. This is 1920, with winter coming on, not 1917 or 1918, and jobs no longer grow on bushes, even for skilled machinists. It is no time to rock the boat. Leaving aside questions of industrial strategy for the time being, the whole affair is to be regretted. As we have already mentioned, the original dispute had nothing to do with Pacific Coast conditions. Why should the Pacific Coast be dragged into its settlement, and the members of the Metal Trades Association forced to choose between submitting to outside dictation as to acceptance or rejection of business offered them, or of discharging many of their employees? In this, as in other labor disputes, the innocent bystander, the general public, suffers. Whatever the outcome regarding the issues involved, there will be a reduction in the amount of work done here, in the number of jobs available, in the total payroll, and in the money spent in the local stores. This reduction is not merely temporary, but will continue in some degree long after the dispute that caused it has been settled, for many of those that have become accustomed to send their work elsewhere will continue to do so. The innocent bystanders, namely, the business men, know this. Why do they ignore the facts and thus put the burden of defending the welfare of the community on the men in a particular line?

The Pessimist

By a Machinery Salesman

"Nothing doing, we will not buy a thing, and I'll tell you that there will be bread-lines before the first of the year", said the Pessimist.

"Bread-lines there will be, old scout, and when you come up for your bread, if it's after I am through with my day's work, you'll find me on the inside of the window handing out the bread to a lot of people like you", said the salesman, "but, not changing the subject except to save time, have you heard that I just landed the order for that milling machine from your friend and competitor at Jones & Co.? He says the things that you and he are manufacturing are necessary for the development of the country and the fact that people are becoming more conservative in their purchases indicates to him that they are going to buy with care, judging quality and price, and that unless he has the equipment to reduce costs he will have to step aside and let the other fellow have the business. Jones is also figuring on a lot of automatics and I think that I will land the order before the end of the month."

There are many pessimistic men who are safe in their own personal financial affairs and who do not care a whoop for anyone else. They can afford to be pessimistic as they can sit back, and the harder they knock, the more people there are who will be convinced. The first thing they know they have scared so many that there is real cause for alarm, and the smug pessimist reaps a harvest.

There are always some that will be led, and as a rule, they are easiest led by somebody they admire, or whom they think is a leader in their line. When such a man says that he is pessimistic, the others run home and say that Mr. Big Gun says the country is going to the dogs. Inside of the next 24 hours it will be reported that he said there would be work for but half the people in the country, and that all the banks would fail during the coming week.

When a man that is pessimistic is in a position of enough importance to have his opinions carry weight, he should express himself with care, and he should always see that the remarks are made to people who will understand that for him to be pessimistic does not necessarily mean that everything will go to smash.

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There are at least two distinct kinds of pessimists at the present time in the metal-trades industries. One is the man who fails to realize that we are in a period of readjustment, that the old order of things is changing, in fact, almost gone, that 'cost about' and 'almost right' are things of the past. The other is the man who is equipping his shop with the latest and best machines he can buy, but is pessimistic because better machines may be developed by the time the ones he has bought have been put to work.

Another man in the metal trades deserving of mention is the man that is trying to be a pessimist and can't. When you call on this man, he is glad to see you, has plenty of time, is cheerful, has money, and is willing to talk. "No, we have got through the rush with the old tools, and we have made money, and we are going to keep it. There are no tools in which we are interested at the present time, and you are wasting your time."

"Maybe you would like to look at these photographs of our automatic milling machine, they show methods of doing work similar to yours," says the machinery 'cutie'.

"Let me see them. What do you know about that? Machine those pieces in one minute? That is certainly some tool, but as I told you we will not buy anything at the present time, and probably not until after the first of the year. Still you might send me a quotation on that machine and send along the catalogue, as I want to show it to my foreman."

The next time that you meet Mr. Pessimist on the street or in his shop, pin him down and try to find out where he gets his 'stuff', he may be a pessimist because he likes the word and doesn't know what it means.

Oil, Power, and the Metal Industries

Old-time residents of California will recall the time, extending even into the early 'nineties, when it was generally accepted that the lack of coal for power purposes necessarily limited the industrial development of the State. In the North-West, the situation in this respect was a little better, but not very much. Then came the development of the oilfields, furnishing a fuel that, for some time, was absurdly and unreasonably cheap. Almost coincident with the development of the oilfields came the development of hydro-electric power, checked for a time by the lack of suitable National legislation, but now, apparently destined to progress rapidly.

The industrial development that has come to the Pacific Coast during the past generation as a result of the availability of fuel-oil and hydro-electric power has been remarkable, but the development that is to come should be even greater. In a recent address before the Water Power League of America, Mr. A. T. Vogelsang, First Assistant Secretary of the Interior, predicted that the industrial centre of the country must ultimately pass from the East with its high-priced coal, getting higher all the time, and its small available waterpower, to the West, with its abundant possibilities for hydro-electric development, and its shorter distance from many raw materials.

Another aspect of the power question was discussed recently before the Commonwealth Club, by Mr. D. M. Folsom, manager of the land department of the General Petroleum Company. He showed that only by the most strenuous drilling campaign throughout the State is it possible to maintain production at its present point, and that, even were new fields to be developed, any material increase of production would be improbable. In spite of this, consumption continues to outstrip production. Evidently somebody has got to use less fuel-oil. Little relief is to be expected from substitution of coal, as nearly all consumers so situated geographically as to be able to use coal, have already remodeled their plants accordingly. Nor can a line be drawn between essential and non-essential users. Nearly every consumer of oil really needs it.

Leaving aside the obvious duty of every consumer of oil to use it as efficiently as possible, Mr. Folsom mentioned two principal ways by which the need for restriction of consumption can be met without hardship to the community. The first was the substitution of electric energy wherever possible for power obtained from fuel-oil. This carries with it as a necessary consequence, the construction of many hydro-electric plants. Secondly, where hydro-electric power cannot be used, as in ship propulsion, internal-combustion engines, because of their more efficient use of fuel, should be substituted for steam-engines or steam-turbines.

Mr. Folsom's recommendations, and the conditions that inspired them are of special importance to the metal trades, not only because the metal-trades plants are large users of fuel-oil, both for power and for metallurgical purposes, but, more important yet, because of the volume of business that will follow the carrying out of the measures recommended. In the construction of the necessary hydro-electric plants, hundreds of millions of dollars will be spent on electrical and other machinery, and on steel pipe, steel towers for transmission lines, and similar equipment. Western shops will supply much of this material, could perhaps supply all of it. It is true that the Pacific Coast has done little in the manufacture of large electrical machinery, but is there, for instance, anything intrinsically impossible in the manufacture of a generator in the same locality as the Pelton wheel that drives it? At the other end of the power line are the thousands of electric motors that will replace engines of all kinds. This also is a field in which the Eastern manufacturer has had the lion's share, but there is at least one concern that has demonstrated the feasibility of making motors on the Pacific Coast.

The second recommendation also spells Opportunity for the metal industries of the Coast. The San Francisco Bay district was among the first in America to develop gasoline and distillate engines, and other Pacific Coast centres have followed. Semi-Diesel and full Diesel engines are now also manufactured, and whatever the type of fuel used, a Coast-made engine can be found that is not surpassed by manufacturers elsewhere. The future of the oil-engine business on the Pacific Coast seems assured.

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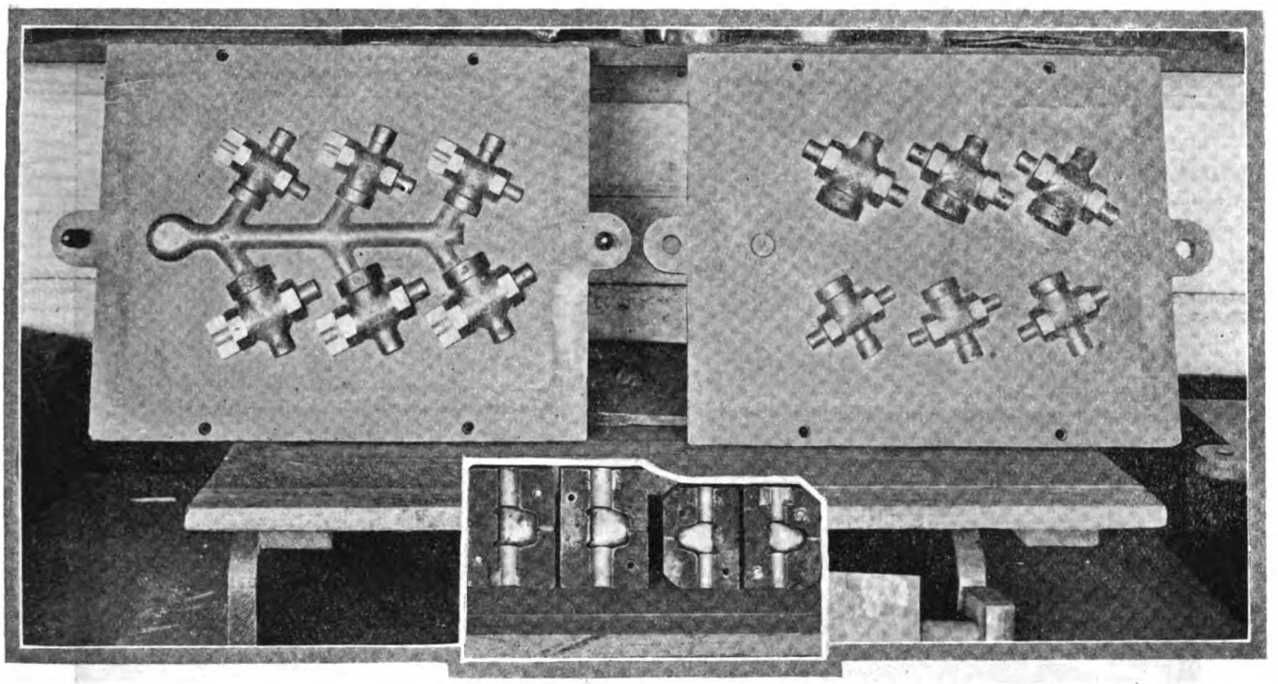

FIG. 1. PATTERN FOR VALVE-BODIES

Bay District Firm Successful in Quantity Production of Brass Fittings

The manufacture of brass pipe-fittings is proverbially 'a hard game' and Western foundrymen usually consider it impracticable to meet Eastern competition in this field. One notable exception to this rule is the manufacture of ½ and ¾-in. valves for oil and steam lines by the California Metal Works, of Oakland, for the Coen Co. of San Francisco. Certain details of this work are illustrated in the accompanying photographs.

Fig. 1 shows the aluminum plate-patterns for molding the main body of the valves, each flask containing three of the ½-in. and three of the ¾-in. valves. The core-boxes for both sizes of valve are shown below. Fig. 2 shows the patterns for the hexagonal bottom-nut and for the valve-stem, each flask containing three parts for each size of valve. The molding is done on a Modern molding machine made by the Arcade Manufacturing Co., of Freeport, Illinois.

Fig. 3 shows the assembled valve, of both sizes, also the principal parts. Fig. 4 shows the holding fixture and general arrangement for the principal machining operations on the body of the valve, a Warner & Swasey turret-lathe being used. The time required for securing the

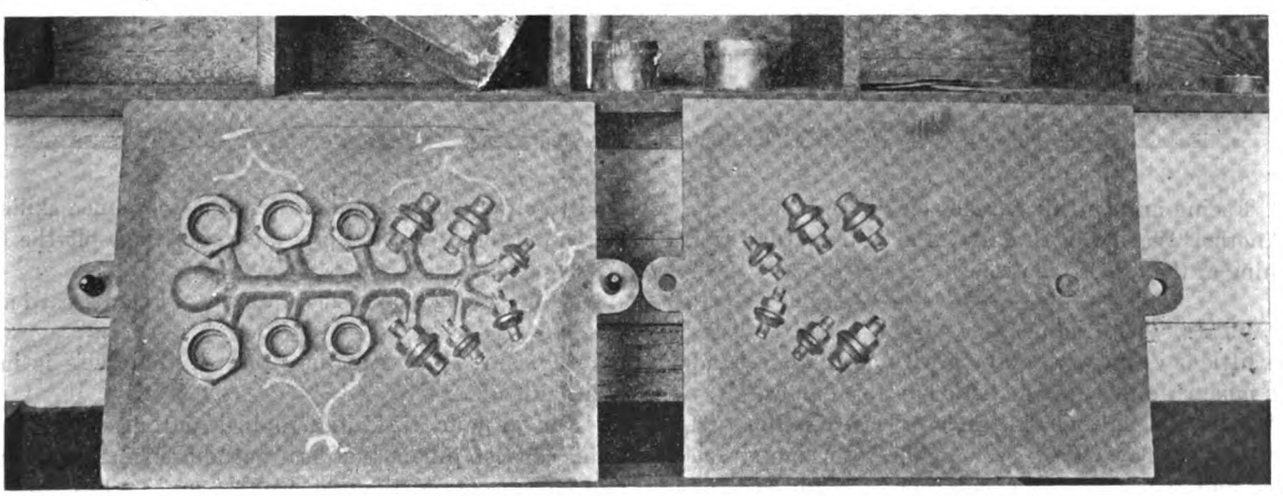

FIG. 2. NUT AND VALVE PATTERNS

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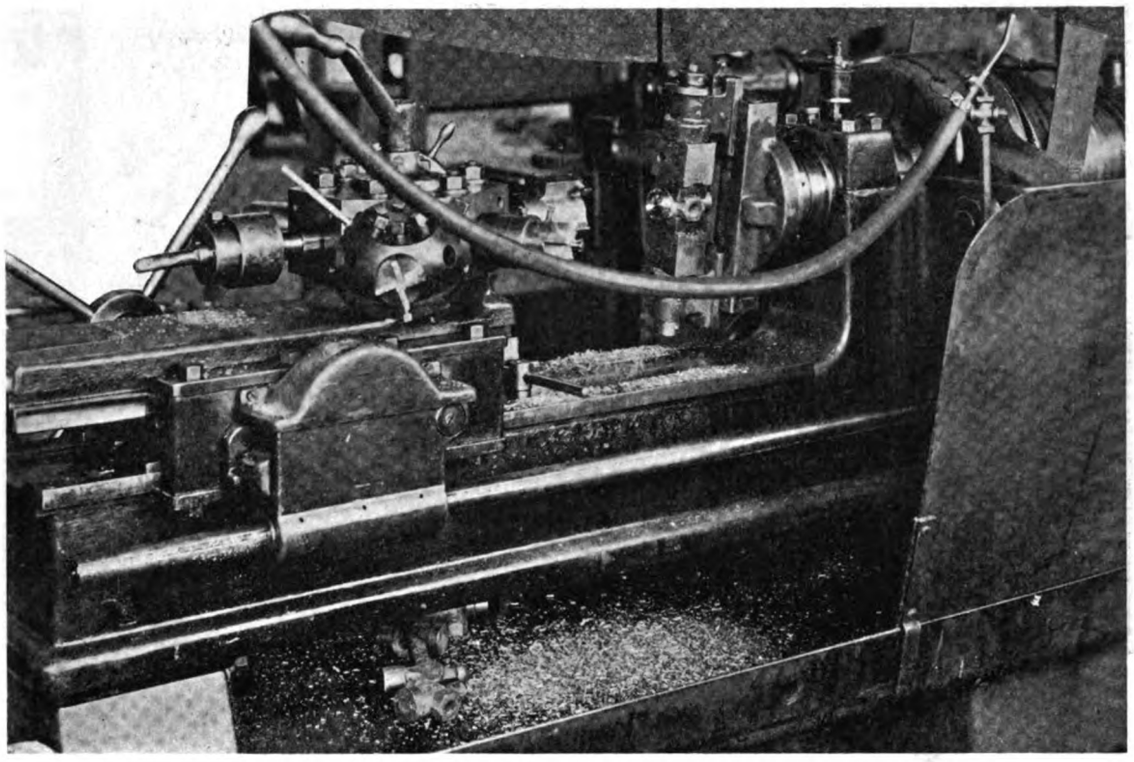
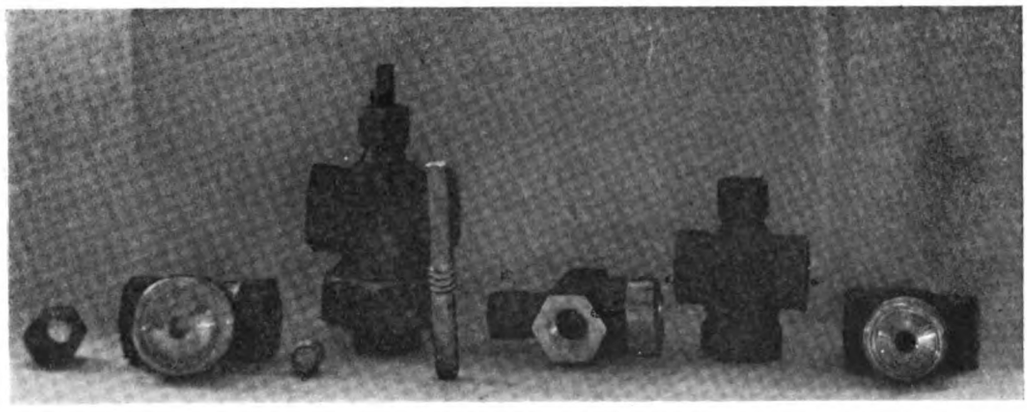


FIG. 4. MACHINING VALVE-BODY ON WARNER & SWASEY LATHE

piece in the fixture is nominal. The following operations are performed at one set-up:

1. Boring, facing, cutting threads, and machining the seat on the bottom of the valve.



ASSEMBLED VALVE AND PARTS

2. Facing and cutting threads on the two ends.

Another Warner & Swasey lathe is used for the machining of the top of the piece.

"WILLIE," said the mother, "I don't like the looks of that little boy you were playing with on the street today. You mustn't play with bad little boys, you know."

"Oh, but he isn't a bad little boy," cried Willie. "He's a good little boy. He's been to the reformatory school twice and they've let him out each time on account of good behavior."

JOHN POLLARD, member of the Federal Trade Commission, was raised down in Virginia where real live bears still roam in the woods. In the same neighborhood with Pollard there once lived an old fellow whose wife made his life miserable. It was her custom to bounce skillets, brickbats, pieces of stovepipe and scantlings off the old man's dome.

One day a neighbor rushed into the old man's yard and cried:

"Jim, hurry down to the pasture; your wife is in a fight with a bear!"

"Not on your life," Jim replied, pulling at the stem of his corncob pipe, "that bear got himself into that fight and he can get out the best way he can."—'Los Angeles Times.'

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The Personal Element in Safety

Speaking before the recent Congress of the National Safety Council at Milwaukee, Frank Moffett said in part as follows:

The personal element enters into safety just as it enters into the quality and general appearance of the commodity being produced by labor. With the proper kind of help we can make good castings that will stand the physical tests required to meet the specifications, but sometimes we have trouble in making good castings because in producing castings we must deal with humans and all humans have a personal element.

We have three elements of hazard with which to contend: Our material, our machines, and our men. The rules for the prevention of accidents naturally divide themselves into two main classes; those which primarily concern the employer, and those which must be observed by the workman in his effort to guard himself against injury. The employer must provide the required safeguards; the employee must use care in operating his machines and doing his work without taking unnecessary chances, for no machine is endowed with brains. Therefore, it is up to the operator to do the thinking and lend a guiding hand.

In treating the personal element the question of fatigue has been the subject of much study. The tendency now is, however, to recognize a still more important factor, namely, the whole mental condition of the men. The ability to keep attention constant, to resist distraction by chance happenings in the workshop, and especially the ability to foresee the movements of various machines, cranes, vehicles, and the other fellow, varies materially among different men. We have men who practically never have an accident, because they feel beforehand, even what the confused operator or the unskilled mechanic will do, while others experience accidents of all kinds because they do not foresee what is likely to happen. They can hardly be blamed, as they were not careless, and yet accidents did occur because of their personal qualities; they simply lacked foresight.

Aside from the man's psychological make-up we may consider some of the secondary factors. The man may be too daring, and may like to run risks; he may be old or he may be young; or he still may need discipline; any one of these coupled with the fact that he may have something on his mind or troubles of his own.

Stretches of hard work without periods of proper relaxation and recreation may bring about a breakdown in the better judgment of the worker. Nights without proper rest are fatal to his highest efficiency on the following days. The man whose mind is ill at ease, or who isn't properly fed, or who is up against the sordidness of many of the dwelling-houses in cities may make our plant more unsafe than it would be if we removed every safety device in the whole factory.

The point that I wish to make is that accidents caused by the personal element are not due so much to carelessness or foolhardiness as to ignorance of hazards and the proper way to do the work, hesitancy in asking questions, or to troubles that divert the man's attention.

Lack of knowledge concerning compressed air on the part of the unskilled artisan, deserves special mention. Only lately in passing through the foundry I saw two men, one a white foreigner and the other a negro, tussling together, an air-hose being the object of possession. They stopped momentarily while I passed. As I proceeded farther on my way, a passing glance showed that the friendly struggle was proceeding as at first. I retraced my steps, and being a member of the safety committee, took it upon myself to inform the men in question that they were playing with something very dangerous. The expression on their faces plainly showed that they knew better and that there was no danger. The foreigner then said with an air of finality, "This is not electricity, it can't hurt you." A little explanation on my part revealed to him that there was the possibility of an agonizing death, a broken ear-drum, or other serious injury. The colored man was an interested listener and no doubt will heed the warning in the future, but the foreigner perhaps did not really understand, still retains that possibility of accident, which, when it does happen, will be charged to the personal element, and behind the personal element is ignorance.

The human element in safety demands the assistance of the foremen if we are to attain any results at all. Responsibility in all industries must be put squarely up to the foremen in hopes that they may be awakened to caution and vigilance. I don't mean to say that the foreman is a cure-all, but in as much as he is in direct personal contact with the laborer he can encourage him to freedom and confidence, if he (the foreman) will avoid any such appearance of superiority as may overbear and depress those under him.

While serving on a safety committee, we were making an examination of the carpenter-shop. Our practice called for the foreman to accompany the safety committee on inspection trips in his department. This occasion brought forth one of the peculiarities that foremen sometimes possess. This man was of the old school and was inclined to view the safety committee with a little skepticism.

Several of the guards on the high-speed woodworking machines were off at one side and not in place, while the operators were using the machines. Naturally the foreman was asked why the guards were off, and why he permitted the workmen to operate the machines without guards. These questions animated his feelings and excited his nerves, while his answer stimulated his muscular movements, for his hand and voice started to work in synchronism. Among several statements one was particularly emphatic, for he used a great sweeping gesture with his hand, saying: "Why, we don't need any guards

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on these machines. We haven't had an accident here for years." Just then the scrutinizing eyes of a member of the committee saw that there were several fingers missing from the hand that was waving so gloriously in fond recollections of the past.

You know that the mind has some peculiar characteristics, one of them being the ability to remember the pleasant things and to forget the unpleasant things, just as the gambler remembers his winnings and not his losses. So it was with this carpenter foreman. He remembered that they had not had any accidents for several years, and had forgotten about his own mishaps. When the truth became known it was found that each finger that was missing was lost in a different accident. This living example of the 'guardless days' will no doubt be a good advertisement for better protection, after he realizes that safety work is a necessity and not a menace and that the safety committee does not belong to the 'What's-the-use brigade'.

The value of bulletins can be appreciated only after careful observation of the attraction they have for the average employee. The reason for the attraction is that the worker sees in the pictures the other fellow, just as the accident happened, and naturally accidents always excite curiosity. These bulletins should be placed in selected positions, such as near the drinking fountain or lavatory, the places frequented most during the working hours of the day. The worker can easily fall into a rut, in so far as safety is concerned, but these bulletins will help to bolster up his ideas. When, after working several hours at the same old grind, he pauses long enough to go and get a drink and take a little relaxation and sees the bulletin, his mind is momentarily diverted and aroused by the thought brought out by a properly illustrated bulletin. I might say that the reading of the bulletins is restful as well as educational, especially if they are short, snappy, new, forceful, and right to the point, much like the present-day advertisements along the highways. They cannot fail to bring results for their message is working every moment of the day.

Effect of Ultra-Violet Rays on the Eyes

By C. R. KINDALL*

Recently 30 men were viewing the demonstration of a new portable electric-arc welding-outfit. A few hours later 17 of the men reported to the doctor for treatment. They were suffering from traumatic conjunctivitis. In two cases the pain was severe and the symptoms were similar to those of iritis. Morphine had to be administered to afford relief from pain. Of the 30 men only two were not affected in any way by this exposure. These two men wore thick-lensed orange-colored glasses. Several of the men wore orange-colored glasses with thin lenses, but the latter were not heavy enough to afford protection against an exposure as long as took place. The distance of the eye from the arc also influences the possibility of injury. Conjunctivitis is an inflammation of the conjunctiva; the conjunctiva is the mucous membrane covering the inside of the eyelids and parts of the eyeball. Traumatic conjunctivitis is caused by foreign bodies in the eye, exposure of the eyes to high winds, dust, smoke, intense light from electric-arc lamps, and from electric-welding apparatus. In the instance mentioned above, the inflammation was due to the ultra-violet rays. The ultra-violet rays lie beyond the violet rays in the spectrum and are invisible to the eye. In some cases the effect is so severe that, in addition to conjunctivitis, an inflammation of the skin similar to sunburn is produced.

The symptoms of conjunctivitis caused by intense light or by the ultra-violet rays are marked photophobia (abnormal intolerance to light), excessive secretion of tears, intense smarting of the lid, contraction of the pupil, sometimes swelling of the lid, and small ulcers developing on the eyeball or cornea. Unless properly treated by a physician immediately, chronic inflammation of the conjunctiva, cornea, iris, or retina, and possibly blindness, may result.

Under proper treatment most cases get well in a few days. All treatments should be under the direction of a physician. That usually advised is to place ice packs on the patient's eyes three or four times daily. The pack should be left on from 15 minutes to an hour. The eyes should be irrigated several times daily with normal salt solution (a teaspoonful to a quart of sterile water) or else a saturated solution of boric acid. If there is a discharge of pus, a few drops of a 25% solution of argyrol or a 5% solution of protargol should be placed in the eyes three to six times daily. In order to avoid complications the patient should be confined to a darkened room until his condition improves. These treatments will reduce the swelling, give the patient comfort, and prevent the development of chronic conjunctivitis. In severe cases it may be necessary to administer morphine to relieve the pain.

At every plant where electric arc-welding outfits are used, there should be an adequate supply of glasses, the lenses of which are made up of alternate layers of red and blue glass, or else orange glasses of sufficient thickness to protect the eyes from the effects of ultra-violet rays. There should also be on hand at the plant dispensary or hospital a supply of boric acid, sterilized water, ordinary table-salt, argyrol, and protargol for immediate use. As previously mentioned, all cases of traumatic conjunctivitis, caused by exposure to bright light or to ultra-violet rays, should be treated under the direction of a physician.

*Surgeon, U. S. Bureau of Mines.

THE office boy was sitting with his feet on the boss' desk, a cigarette in his mouth, reading a magazine.

"Is Mr. Smithers in?" asked the caller.

"What do you ask me a fool question like that for?" replied the boy. "Do you think I'd be sitting here like this if he was?"

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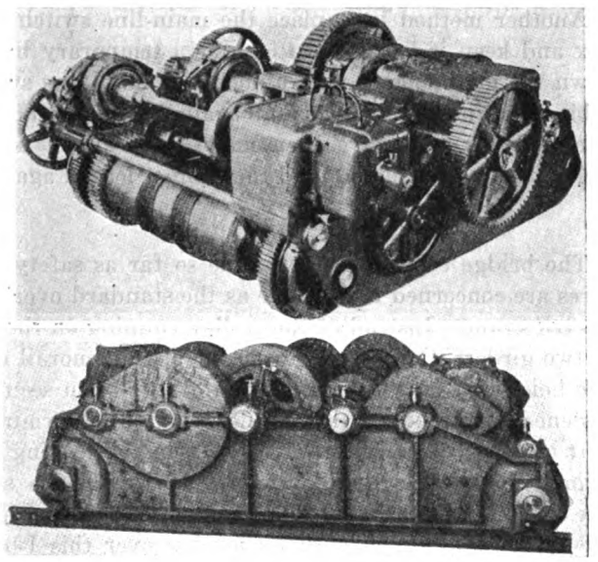
Crane Safety Devices*

By NICHOLAS PRAKKEN†

There are as many different types of cranes and hoists today as the different kinds of service that demands them. This paper will be confined to the class of cranes that are used in foundries, machine-shops, yards, shipways, and warehouses.

An electric cage-controlled monorail hoist is often used in connection with transfer bridges for the same work as a crane with the added flexibility that it can leave its bridge and travel to remote points on permanent overhead I-beams, either to pick up a load or to deliver one. Electric floor-controlled hoists have the same flexibility, but are limited in speed to that of a man walking. With



ABOVE, OLD TYPE OF CRANE WITH UNGUARDED GEARS. BELOW, CRANE WITH ENCLOSED GEARS.

either electric cage or floor-controlled monorail hoists, accessories are available for flexibility of operation, such as switches and turntables. These accessories incorporated in a system with curved tracks makes it possible to give service to the different parts of a plant.

Cranes

Among cranes, the standard electric overhead traveling type is the most serviceable of all. The girders span from wall to wall and the entire crane usually runs the whole length of the building, passing over workmen with its burden.

The crane is composed of three units: bridge, trolley, and cage. Each one of these may be again divided into its principal parts.

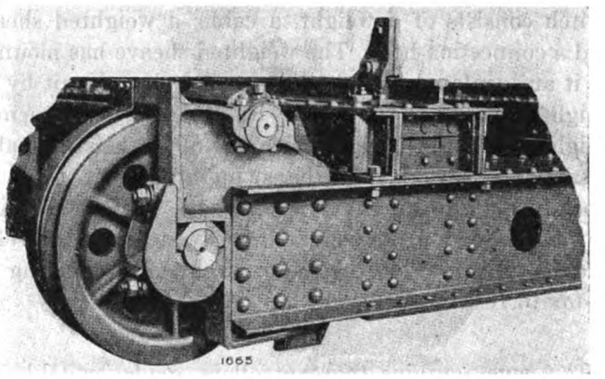
*Delivered before the Metals Section of the Ninth Annual Safety Congress of the National Safety Council.

†Pawling & Harnischfeger Co., Milwaukee.

Bridge

The bridge is composed of truck-ends, girders, bridge machinery, foot-walks, and electrical equipment. The safety features that safeguard the workmen are naturally a part of the design. The first essential is liberal strength and proper proportions for every piece in the crane.

The truck-ends must carry the total weight of the girders, trolley, and load. The truck-ends in a well-designed crane are usually of a box-section with cast-steel truck-housings securely riveted between the channels forming the side-members of the truck-ends. It is in the truck-ends where the safety features are found. Rail-chocks are provided on this steel housing that project an inch or more below the top of the runway-rail. The rail-chock will prevent the truck-end from leaving the runway in



SHOWING GIRDERS SECURELY RIVETED

case of a wheel breaking. The truck-ends are also provided with rail-fenders made of steel plate that fit over the rail. Their function is to brush a workman's hand off the rail. Spring-bumpers are likewise attached to the top of the cast-steel truck-housing to prevent the wheels of two cranes on the same runway running into each other. The M. C. B. bearing is used almost universally. In this bearing, the wheel is keyed to the pin and the pin revolves in bronze journals on both sides that are accessible and are readily renewed.

The girders most used are the I-beam and channel and the box. The I-beam and channel-girder is used on medium spans and for capacities up to 15 tons. The box-girder is usually built up to about 125-ft. span and any reasonable capacity. The greatest load will be imposed upon the girder that has the bridge machinery and foot-walk mounted on it. The safety feature in the girder-mounting is the coping of the girder around the box-section of the truck-ends, and securely fastening the two together by top angles, vertical-shear angles, and bottom-cover plates. Many cranes are assembled by merely bolting the girders to the tops of the truck-ends. This

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method permits the trucks to rock if a bolt becomes loosened. With the girders coped into the truck-ends the bridge becomes a rigid unit.

The safety features in the foot-walk are strong angle-iron hand-rails, and the running of the flood-boards solid to the girder, with a six-inch angle-iron bordering the foot-walk so that no tools or parts can be kicked off the walk.

Trolley

The component parts of the trolley are: trolley-sides, girts, gears and gear-cases, drums, and electrical equipment.

The trolley-sides are preferably of box-section and provided with M. C. B. trucks and rail-chocks. The rail-chocks act in the same manner as those on the truck-ends of the bridge. The structural girts are bolted in between the trolley-sides. On the trolley-sides and girts are placed the motors, totally enclosed gear-cases and gears, equalizing sheaves, and the limit-switch. The most important safety features on the trolley are the total enclosing gears and the limit-switch.

The safest type of upper limit-switch is the one that opens the hoisting-motor circuit through a relay. This switch consists of a weight, a cable, a weighted sheave, and a connection-box. The weighted-sheave has mounted on it an insulated arm that closes the relay circuit by the weight attached to the cable. Fastened to the suspended weight is a loop, through which one of the hoisting cables passes. Irrespective of the swinging of the load, the block in the upper travel will carry the suspended weight upward, allowing the weighted sheave to open the relay-circuit, thus opening the motor-circuit and bringing the motor to rest.

Cage

The cage contains the controllers, grids, switchboard, and foot-levers to stop the bridge.

Controllers are either crank, radial-arm, or lever-control. Preference is usually given to either the crank or lever-control. With the crank-control the controllers are mounted in the front of the cage similar to the standard street-car controller. In lever-control, the controllers are placed at the rear of the cage in a cabinet and connected to the lever-stand by bell cranks and rods. The direction the lever is moved usually indicates the direction of motion. A notch in the lever-stand tells the operator when he has his controller in the 'off' position.

A safe position has been found for the grid resistances. They are mounted on a sub-floor underneath the floor of the cage. The floor of the cage is provided with trap-doors so the grid-units can be inspected. The sub-floor is a more convenient place to mount the grid-resistance units than upon the foot-walk and in addition considerable extra conduit and wiring are eliminated.

The switchboard is placed at the back of the cage in a closed cabinet. For inspection or repairs, the doors can be opened and, since everything is enclosed, no casualties can occur.

In the cage is likewise placed the foot-lever. For inside cranes the bridge-momentum is arrested by pressing on the foot-lever. In outside cages the brake is normally 'on', and it is released by the operator's foot when he wishes to travel.

On outside cranes a runway lock is employed in the form of a curved arm that falls over a structural member belted or riveted to the end of the crane runway. This lock will hold the crane securely to the runway in case of a heavy wind.

Maintenance Safety-Devices

Many different methods are used to keep the crane out of service during repairs. Often two or more men are busy repairing different parts of the crane. To provide for this contingency, one side of the main-line circuit has three sockets with plugs. To complete the circuit, all three plugs must be in place. Even if three repairmen are at work on the crane, each one can keep a plug in his pocket until his task is completed. When all three have finished, the three plugs will have been returned to their respective sockets.

Another method is to place the main-line switch in a box and keep it locked. In case of a temporary breakdown the maintenance man unlocks the main-line switch cabinet, opens the switch, and again locks the cabinet. When the repairs have been made, the cabinet is unlocked, the switch closed, and the cabinet locked again.

Transfer-Cranes

The bridge of the transfer-crane so far as safety features are concerned is the same as the standard overhead electric crane. Instead of the trolley running on the top of two girders, the cage or floor-controlled monorail electric hoist runs on the lower flange of an I-beam securely fastened to the box-girder of the bridge and forming a part of the girder. This crane functions by leaving this beam registering with a stationary I-beam of the same size and on the same level so the monorail hoist can leave the bridge and travel with its burden over this I-beam track, including switches, to its destination. Provision must be made in the registering so that the beam will be in perfect alignment with the spur-beam when the crane is to run from one to the other, and likewise the ends of the transfer-crane beam must be baffled so that the monorail hoist cannot run off the ends when not registered with the spur-beam.

This baffling is usually accomplished by a baffle that is raised when the locking to the spur-beam takes place. In case there are a series of bays in the shop, and in each bay a transfer-crane connected by short spurs to the adjacent bays, both ends of the spurs as well as the ends of the beams of the cranes must have interlocking baffles operated from the cage of the monorail hoist. This is necessary to ensure perfect alignment of both cranes so the monorail hoist can travel safely from one crane to the other without accident.

When either two or three-way switches are incorporated in the runway system, the spurs as well as the tongue of the switch must be baffled, for, if a switch is partly thrown and not correctly registered, the monorail could run off the tongue between the spur-beam connecting

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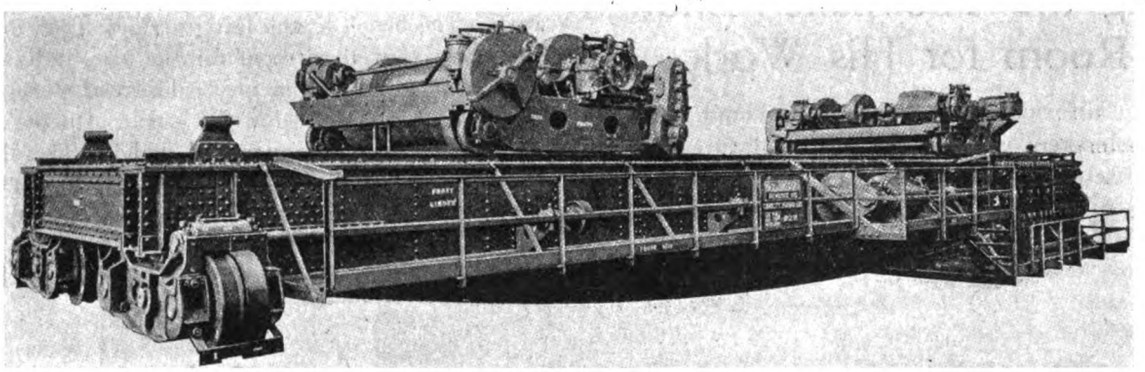
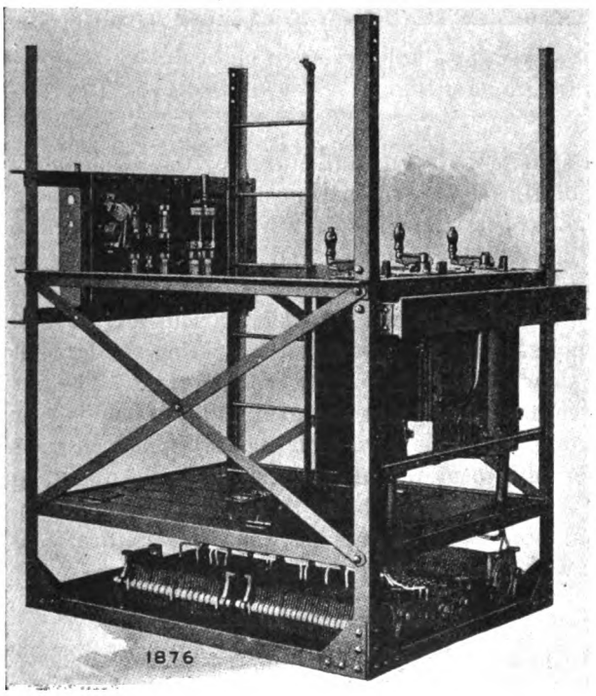


PAWLING & HARNISCHFEGER CRANE, SHOWING VARIOUS SAFETY DEVICES

with the switch. These baffles are either of the type that drops over the sides of the I-beam or that interlock with the web of the spur-beam and the tongue of the switch. If the dropping type of baffle becomes bent, the monorail hoist can run underneath the baffle and off the beam. But in the interlocking type a sufficient momentum must be obtained actually to shear several square webs of cast-steel.

In the past, cage-controlled monorail hoists have fallen

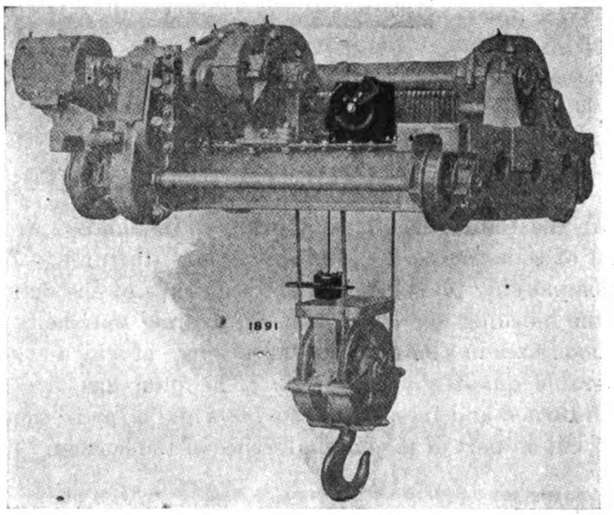


CRANE CAGE, SHOWING POSITION OF GRID RESISTANCES

from their runways when the king-pin broke. Two types of devices are employed today to prevent the falling. One type is a cast-steel collar fastening the hoist and trolley together and the other is a safety-catch of cast-steel that fits around the lower flange of the monorail I-beam, but always has sufficient clearance so that it offers no friction to impede the travel of the monorail. The safety-catch type is kept clear of the flanges of the I-beam on curves by links attached to the trucks, which keeps the safety-catch central with the I-beams.

Where the transfer-cranes are floor-controlled, the registering and locking is done by means of pendant ropes. The controllers then must be of the spring-return type, so that the compression of the springs will return the controllers to the 'off' position if the operator releases his hold on the ropes in case he trips over an object on the floor and falls.

For all transfer-cranes, in order to hold them securely in place while at rest, the motor driving the bridge must



LIMIT SWITCH

be equipped with a strong magnetic brake. This brake is 'off' only while the crane is under way and 'on' whenever the crane is at rest.

Good judgment and care exercised on the part of the operator or repairman are the greatest preventives of accidents. But the above safety devices have proved themselves indispensable, and are being furnished as standards by most manufacturers of cranes.

"You seem popular with the summer girls, Cholly. You can't say that nobody likes a fat man."

"I'm popular when the trunks come down at going away time. Then they jolly me a little. Want me to sit on the trunks so they can be strapped."

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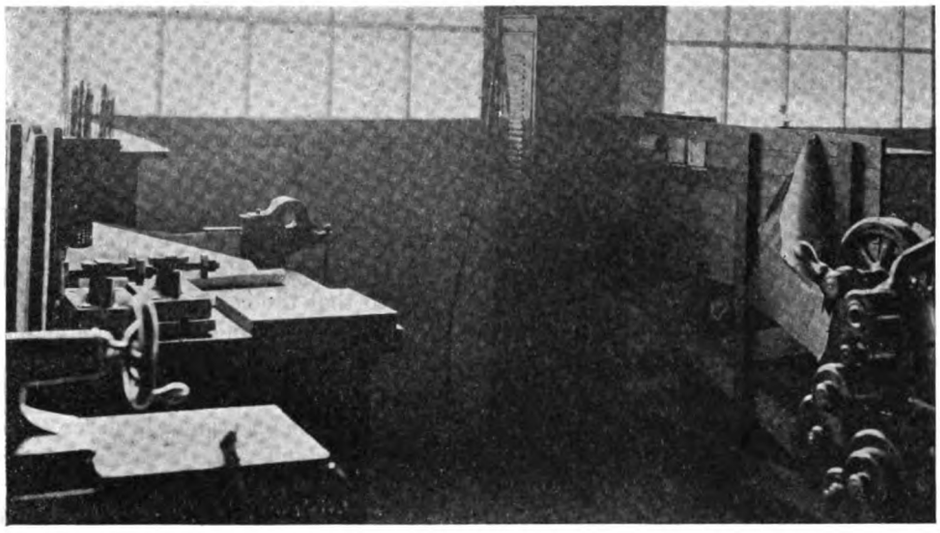
Giving the Toolmaker Enough Room for His Work

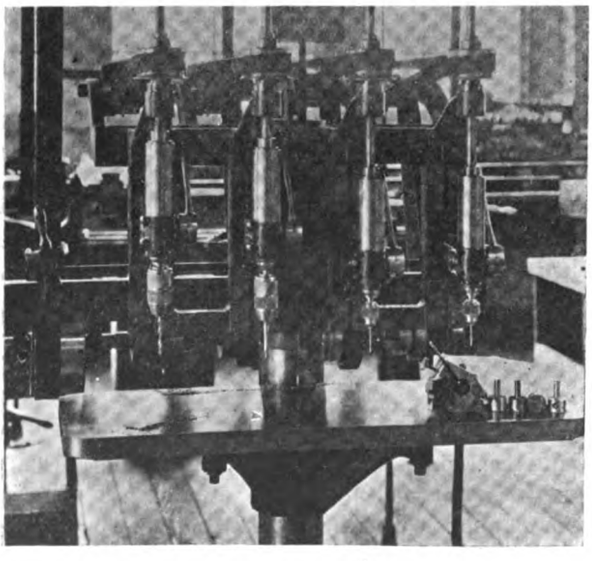
At the California Metal Works, at Oakland, there are several toolmakers, working on tools and fixtures both for the shop itself and for outside customers. Each man has an alcove such as the one shown in the illustration adjacent to the machine-tool on which he does most of his work. The bench at the left provides space to spread a blueprint, as well as room for the vise, individual tool-chest, and other equipment. Additional storage-space is provided in drawers below the bench. On the other side is a locker, and 'hanging space', which is useful for various purposes. These facilities occupy some floor-space, but, in the end, they save time, and therefore money.



TOOLMAKER'S BENCH AND EQUIPMENT

An Interesting Drill Fixture

At the California Metal Works, at Oakland, a great deal of soda-fountain equipment is manufactured. The accompanying photograph illustrates some of the details of the finishing operation, namely, drilling four holes of various sizes in a small brass faucet-plug, of which a considerable quantity is required. The plug has already been turned and faced on all surfaces and a small 'shoulder' cut on part of the circumference of the bottom. The four-spindle drill is manufactured by the Sigourney Tool Co., of Hartford. The fixture used for holding the plug is shown open to receive the work. When the work is inserted, the cover is closed and locked in position. Adjoining the fixture is an undrilled plug, while the other three are drilled plugs placed at various angles to show the holes. The first operation is drilling the large hole, best shown in the plug on the extreme right. The fixture is then moved to the second drill and this hole is reamed and tapered. The third drill makes the hole in the side of the plug near the larger hole, while the fourth drill makes the two small holes in the bottom of the plug. Rapid production is possible when this fixture is used, even with a semi-skilled operator.



DRILL FIXTURE

CHLORINE, the dusky queen of the kitchen, showed up at the receiving teller's booth with an air of determination on her midnight features.

"Ah wants you should take care of dis yeah cash fo' a while," she remarked, planking down her savings of several years.

"Why, Chlorine," ejaculated the teller, who knew her of old, "I thought you always said you'd never trust the bank."

"Dat's all right, dat's all right, but de circumferences surroundin' de matter makes me change mah mind. Yo' see, I'se gwine get married an' Ah don't want dat much money round de house with no strange cullid man on de premises."—American Legion Weekly.

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Steel For Machine Parts*

By ROBERT M. TAYLOR†

Not much information has been published to indicate to machine-tool builders what materials are generally used by the machine-tool industries. In most cases a selection of material is made by conferring with the steel-mill salesmen. This method may have its advantages, but it has caused the same material to be called by many different names. When a buyer tries to buy a material from a different source it is a difficult task to juggle the trade names, analyses, and physical specifications to get a comparison.

The automobile manufacturers met with the same difficulties, and early in their career, they saw clearly the advisability of preparing uniform specifications and classifications for materials for their industry, and through the Society of Automotive Engineers they developed the SAE specifications for steels.

These steels have been manufactured in large quantities. Some steel-mills make a specialty of them, and practically all mills manufacture them. If the same or a similar classification were adopted by other industries it would be of great assistance to buyers and steel manufacturers.

The basis of the SAE system of numbers is as follows:

The first figure indicates the class to which the steel belongs, thus '1' indicates a carbon-steel, '2' nickel, '3' nickel-chromium, '5' chromium, '6' chromium-vanadium, and '9' silico-manganese steels. For the alloy steels the second figure generally indicates the approximate percentage of the predominant alloying element. The last two or three figures indicate the average carbon-content in 'points' or hundredths of 1%, thus, 3120 indicates a nickel-chromium steel with approximately 1% nickel (1.00% to 1.50%) and 0.20% carbon (0.15% to 0.25%). Also 1020 indicates no alloy, straight carbon approximately 0.20% carbon (0.15% to 0.25%).

The heat treatments have also been standardized, and are designated by letters. When you speak of 6120 B to an automobile manufacturer he knows you mean a carbonized chromium-vanadium steel.

Shafting

No. 1020 is usually in a cold-rolled state. This same analysis is also frequently used 'turned and ground'. The cold-rolled has a disadvantage where long keyways are to be cut because the keyway relieves the surface tension and causes the shaft to buckle or become untrue. No. 1045 can be used for shafting requiring greater strength. The same remark concerning finish of No. 1020 also applies to No. 1045.

Spindles

No. 1045 made by crucible process is most generally used. This material can be heat treated to increase strength when desired, treatments D, E, or H being used. No. 3135 made by the open-hearth process in such quantities as to ensure uniformity has been popular with concerns demanding a high-grade alloy-steel spindle. It has not been the practice to heat treat this material for ordinary spindles, but the material improves so much with heat treatment that it is advisable to do so, especially if there are any keyways or shoulders. Some concerns run the hardness up to 60 scleroscope, and finish machine after heat treating, but in general practice 38 to 45 scleroscope hardness is best because at greater hardness, cutting is difficult. Treatments D, E, or H are commonly used.

No. 6135 is used for spindles in extreme cases where vibration and alternate stresses are most severe. It should always be heat treated, either before, during, or after machining. 38 to 45 scleroscope hardness is the best hardness for spindle service. Treatments T or U are used.

Gears

For gears for low speed and light load, No. 1020 is used in the soft state.

For gears for low speed and heavy load use:

No. 1045, heat treatment H up to 65 scleroscope hardness.

No. 3135, heat treatment H up to 65 scleroscope hardness.

No. 6135, heat treatment T up to 65 scleroscope hardness.

For gears for high speed and light load use:

No. 1020, treatment A or B up to 95 scleroscope hardness.

No. 3120, treatment G up to 95 scleroscope hardness.

No. 6120, treatment T up to 95 scleroscope hardness.

For gears for high speed and heavy load use:

No. 3250, treatment M or Q 72 to 80 scleroscope hardness.

No. 6150, treatment U 72 to 80 scleroscope hardness.

No. 9260, treatment V 72 to 80 scleroscope hardness.

Cams

Where no severe strains are imposed on light sections, No. 1095 can be used, giving treatments F or X, scleroscope hardness up to 90. Where greater strength is required, use No. 3250, treatment Q, scleroscope hardness up to 85.

Where extreme hardness is required, use:

No. 5195, treatment Q up to 100 scleroscope hardness.

No. 6195, treatment U up to 100 scleroscope hardness.

*From 'Transactions' of the American Society for Steel Treating.

†Works engineer, The American Tool Works Co., Cincinnati, Ohio.

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No. 9260, treatment V up to 100 scleroscope hardness.

Centres

No. 1095 is almost universally used, heating in the lead pot and quenching in water. Treatment X gives 90 to 100 scleroscope hardness.

Lead-Screws, Etc.

No. 1135 X is a favorite for this use because of its free and smooth cutting properties.

Sometimes No. 1020 is used for such screws, but it is not advisable to do so except for extremely light duty. No. 1045 is better. Sulphur in this stock should not be below 0.03% or it will be difficult to get a smooth finish on the thread.

Thrust-Washers

No. 1020 or No. 3120 carbonized treatment B are used for light service and No. 1095 treatment X, No. 3250 treatment Q, or else No. 9195 treatment R for heavy service.

Ball Races, Rollers, and Pins

No. 5195 treatment R is a favorite for this service, 80 to 100 scleroscope hardness.

Springs

No. 1095, treatment F is generally used.
No. 6150, treatment U for severe service.
No. 9250, treatment V for severe service.
No. 9260, treatment V for severe service.

Keys

No. 1020 in cold-rolled condition is frequently used, but is not recommended except where extremely low price is required. No. 1045 is much preferred in a tempered condition because of its ability to resist distortion. When a key begins to rock, the lower-grade material will distort quickly. No. 3250, treatment M is used for sliding keys, etc., where a wear-proof key with great strength is required.

Bolts, Nuts, Pins, Studs, and Screws

No. 1114 is especially made to permit rapid screw machine production, with smooth finish, consideration of strength being secondary. This material can be carbonized by treatments A or B. No. 1020 will give much greater strength both in soft and carbonized screws, carbonized by treatments A or B. No. 1045 can be used for a tempered screw, treatment H.

Tool-Post Screws, Etc.

For screws of extreme strength No. 3120 or No. 3135 treatment H will give the best results, hardness not above 65 scleroscope.

Heat Treatment A

After forging or machining:

1. Carbonize between 1600°F. and 1750°F. (1650°-1700°F. desired).
2. Cool slowly or quench.
3. Re-heat to 1450°-1500°F. and quench.

Heat Treatment B

After forging or machining:

1. Carbonize between 1600°F. and 1750°F. (1650°-1700°F. desired).
2. Cool slowly in the carbonizing mixture.
3. Re-heat to 1550°-1625°F.
4. Quench.
5. Re-heat to 1400°-1450°F.
6. Quench.
7. Draw in hot oil at 300° to 450°F. depending upon the degree of hardness desired.

Heat Treatment D

After forging or machining:

1. Heat to 1500°-1600°F.
2. Quench.
3. Re-heat to 1450°-1500°F.
4. Quench.
5. Re-heat to 600°-1200°F. and cool slowly.

Heat Treatment E

After forging or machining:

1. Heat to 1500°-1550°F.
2. Cool slowly.
3. Re-heat to 1450°-1550°F.
4. Quench.
5. Re-heat to 600°-1200°F. and cool slowly.

Heat Treatment F

After shaping or coiling:

1. Heat to 1425°-1475°F.
2. Quench in oil.
3. Re-heat to 400°-900°F., in accordance with temper desired, and cool slowly.

Heat Treatment G

After forging or machining:

1. Carbonize between 1600°F. and 1750°F. (1650°-1700°F. desired).
2. Cool slowly in the carbonizing mixture.
3. Re-heat to 1500°-1550°F.
4. Quench.
5. Re-heat to 1300°-1400°F.
6. Quench.
7. Re-heat to 250°-500°F. (in accordance with the necessities of the case, and cool slowly).

Heat Treatment H

After forging or machining:

1. Heat to 1500°-1600°F.
2. Quench.
3. Re-heat to 600°-1200°F. and cool slowly.

Heat Treatment M

After forging or machining:

1. Heat to 1450°-1500°F.
2. Quench.
3. Re-heat to 500°-1250°F. and cool slowly.

Heat Treatment P

After forging or machining:

1. Heat to 1450°-1500°F.
2. Quench.
3. Re-heat to 1375°-1450°F.

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4. Quench.
5. Re-heat to 500°-1250°F. and cool slowly.

HEAT TREATMENT Q

After forging:

1. Heat to 1475°-1525°F. (Hold at this temperature one-half hour, to ensure thorough heating.)
2. Cool slowly.
3. Machine.
4. Re-heat to 1375°-1425°F.
5. Quench.
6. Re-heat to 250°-550°F., according to requirements, and cool slowly.

HEAT TREATMENT R

After forging:

1. Heat to 1500°-1550°F.
2. Quench in oil.
3. Re-heat to 1200°-1300°F. (Hold at this temperature three hours.)
4. Cool slowly.
5. Machine.
6. Re-heat to 1350°-1450°F.
7. Quench in oil.
8. Re-heat to 250°-500°F. and cool slowly.

HEAT TREATMENT S

After forging or machining:

1. Carbonize at a temperature between 1600°F. and 1750°F. (1650°-1700°F. desired.)
2. Cool slowly in the carbonizing mixture.
3. Re-heat to 1650°-1750°F.
4. Quench.
5. Re-heat to 1475°-1550°F.
6. Quench.
7. Re-heat to 250°-550°F. and cool slowly.

HEAT TREATMENT T

After forging or machining:

1. Heat to 1650°-1750°F.
2. Quench.
3. Re-heat to 500°-1300°F., and cool slowly.

HEAT TREATMENT U

After forging:

1. Heat to 1525°-1600°F. (Hold for about one-half hour.)
2. Cool slowly.
3. Machine.
4. Re-heat to 1650°-1700°F.
5. Quench.
6. Re-heat to 350°-550°F. and cool slowly.

HEAT TREATMENT V

After forging or machining:

1. Heat to 1650°-1750°F.
2. Quench.
3. Re-heat to 400°-1200°F. and cool slowly.

HEAT TREATMENT X

1. Heat to 1425°-1475°F.
2. Quench in water.
3. Re-heat to 300°-600°F. and cool slowly

The Seven Wrong Things

Haven't you ever been coming down Main street,
And seen a crowd at the corner,
And asked somebody what was the meeting about,
And had him say: "There's a guy had a fit"?
And then
In your perfectly natural curiosity to see this guy,
And what he looked like in a fit,
Probably you joined the crowd
With a good deal of force,
So that you got about halfway in the centre,
And then you still couldn't see the guy,
And you got mad at your neighbors because they wanted to see too,
And you pushed some more.
And by and by you got in the centre.
And it was kind of disappointing,
Because the guy lay perfectly still,
And wasn't frothing at the mouth or anything.
But he looked sick and you said angrily:
"Ain't anybody going to do anything for him?"
Although there were six people doing six different things for him already.
And then perhaps you tried to do something too—
Lift up his head or something—
Because you thought you ought to.
But the six others objected.
And you got in a row,
And had words.
And then the doctor came.
And he said all seven of you were wrong and the right thing was something none of you had thought of and you'd probably made him a lot worse than if you left him alone.
And after you got home you began to wonder
Why you hadn't thought of that eighth thing that was right,
Instead of the seven that were wrong.
And you thought how important you'd have felt if you'd really known what to do.
And how you'd probably saved his life,
And been mentioned in the newspaper.
So you went to the phone
And called up the Red Cross
And asked for information about First Aid courses.
And when they said they had a class started and the first meeting was Monday night
You said: I'll be there."
And you went.
And got the right dope on what to do in accidents.
And now when a guy has a fit,
Or a bruise or a burn or a broken arm or a sunstroke,
You know what to do.

A BAY DISTRICT FOUNDRYMAN, who was told that one of his competitors had started business with no capital but his own intelligence, is said to have replied, "Well, that was a mighty small beginning."

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Grinding Operations on the Holt Caterpillar Tractor

The accompanying illustrations, which are reproduced through the courtesy of the Norton Co. and of the Holt Manufacturing Co., are from photographs taken at the Stockton and Peoria factories of the Holt Manufacturing Co. The explanatory text is based on the article appearing in 'Grits and Grinds', the house organ of the Norton Company.

FIG. 1. SNAGGING A CRANKSHAFT

FIG 2. SNAGGING A TRUCK-ROLLER

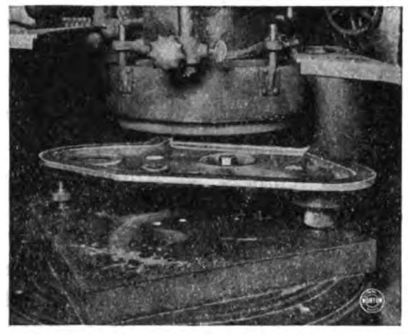

FIG. 3. SUREACE-GRINDING A CAST-IRON GEAR-CASE

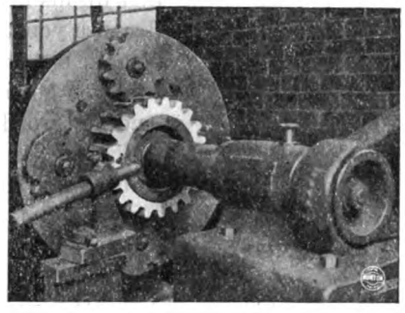

FIG. 4. INTERNAL GRINDING ON A SPUR-GEAR

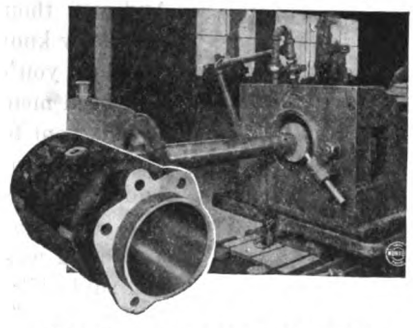

FIG. 5. GRINDING A CYLINDER

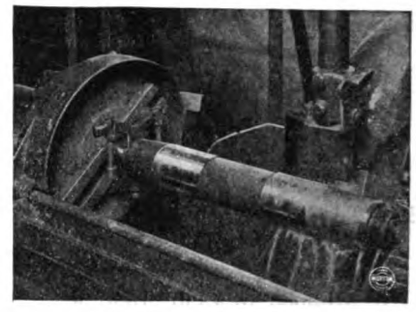

FIG. 6. GRINDING AN INTERMEDIATE SHAFT

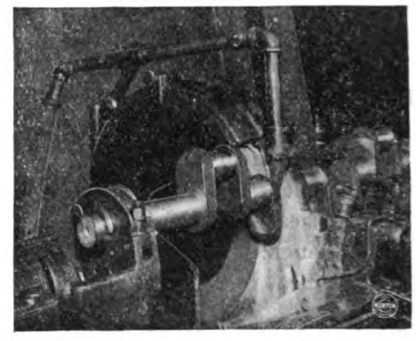

FIG. 7. GRINDING CHROME-NICKEL CRANKSHAFT

FIG. 8. GRINDING THE HOB FOR A TRANSMISSION GEAR

Grinding has an important part in the manufacture of the tractor, beginning with the snagging department. Fig. 1 shows the snagging of a crankshaft. An alundum vitrified wheel, grain 20, grade R, with a 1-in. face and a diameter of 8 in. is used. Fig. 2 shows the snagging of a truck-roller, using a 30-S crystolon vitrified wheel, with a $\frac{3}{4}$-in. face, and a diameter of 8 in. Both these wheels are run by compressed air. For floor-grinding forgings and steel castings an alundum vitrified wheel, 14-S, 3-in. face, and 24 in. diam. is used, while 16-S crystolon wheels are preferred for cast-iron parts.

Fig. 3 shows the surface-grinding of a gear-case cover with an 18 by 5 by $1\frac{1}{4}$-in. rim crystolon wheel, the wheel revolving at 870 r.p.m., and the work at 29 r.p.m. The feed is 0.003 in. per revolution of the work.

In Fig. 4 is shown the internal-grinding of a 21-tooth spur-gear. Before hardening, the hole is bored to 3.862

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in. diam., within limits of 0.001 in. The gear is then hardened to 75 to 85 scleroscope, and then ground to 3.875 in., with a plus limit of 0.001 in. Alundum wheels, either 3846-K or 3860-L are preferred for internal-grinding of gears.

Fig. 5 shows a 36-J crystolon vitrified wheel grinding a cylinder. The diameter of the wheel is 5½ in. and the face ½ in. The cylinders are bored, then rough-ground to remove about 0.017 in. of material, and finish-ground to remove 0.001 in. more. The final size-limits are 6.5025-6.5045 in. diameter.

Fig. 6 shows the grinding of a nickel-steel shaft with an alundum wheel. Fig. 7 shows the grinding of a drop-forged chrome-nickel 0.60% carbon steel crankshaft. Fig. 8 shows a hob for a transmission-gear being ground.

Besides the direct operations on the tractor parts, the maintenance of the various tools requires a large amount of grinding. Fig. 9 shows an example of broach grinding. This particular broach is used for cutting splines in the inner disk-hub of the master-clutch.

FIG. 9. GRINDING A BROACH

For free-hand grinding of tools an alundum vitrified wheel, 46-L, is preferred. There is less likelihood of burning tools than if a harder wheel is used. For grinding milling cutters on a wet tool-grinder, alundum vitrified wheels, 3846-K, with a ½-in. face and a diameter of 10 in. are used. For grinding drills, an alundum vitrified wheel, 46-L, is used. For grinding gauges, an alundum vitrified wheel, 3860-L, is preferred.

"SAY," said the irate visitor, "you had something about me in your paper that has gotta be corrected."

"If the item was wrong," the editor smoothly replied, "we shall cheerfully do as you request."

"I told one of your reporters I saw a beautiful goldfinch perched on a twig just outside of my bedroom—"

"Well—"

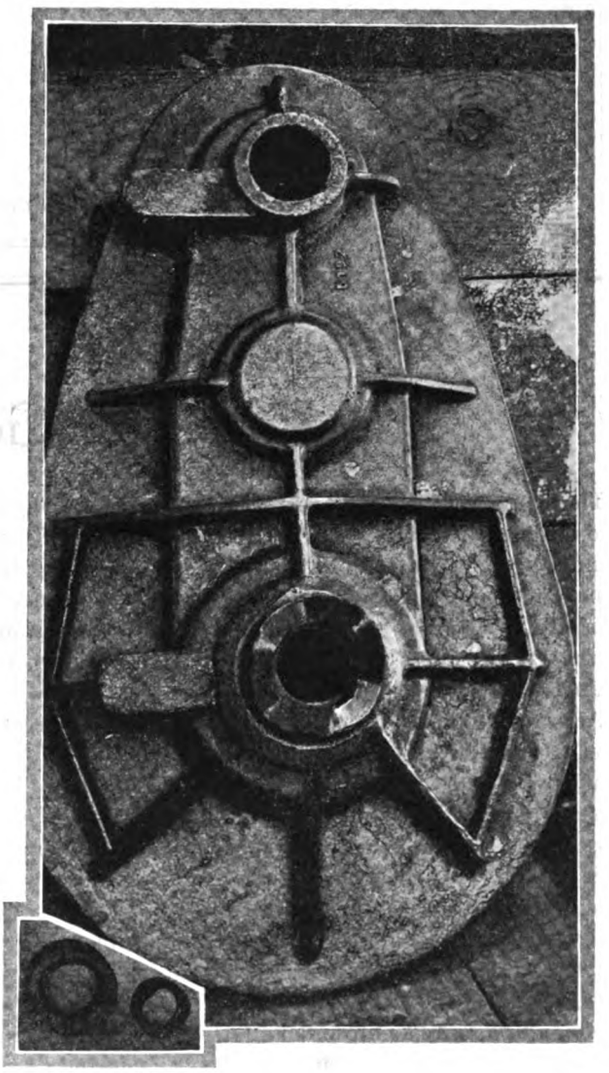
"And when the item came out in the paper it read 'goldfish'."

"That isn't so bad."

"Oh, isn't it, though? Well, ever since it was in the paper friends of mine have been hanging around our house thinking I have a private supply of something to drink in my cellar."—Los Angeles Times.

Use of Chills in the Foundry Saves Time in Machine-Shop

Some foundrymen regard chills as a necessary evil, to be avoided whenever possible. Others look upon them as useful servants to be employed when such employment is an advantage. To this latter class belongs C. A. Smith, superintendent of the foundry division of the Fageol Motors Co. The accompanying illustration shows a casting for the transmission case for the Fageol tractor. The irregular circular projection toward the lower part of the casting used to be cast without a chill. It was hard to hold to the proper size, while the machine work on the irregular surface in particular was expensive. The use of the chill ensures the exact size being obtained, while the only grinding required is the snagging of an occasional projection, the chill giving a surface sufficiently true in general. The two parts of the chill are shown in the lower left-hand corner. Besides the advantages already mentioned the use of the chill makes considerable saving in molding-time.



TRANSMISSION-CASE AND CHILL USED IN CASTING

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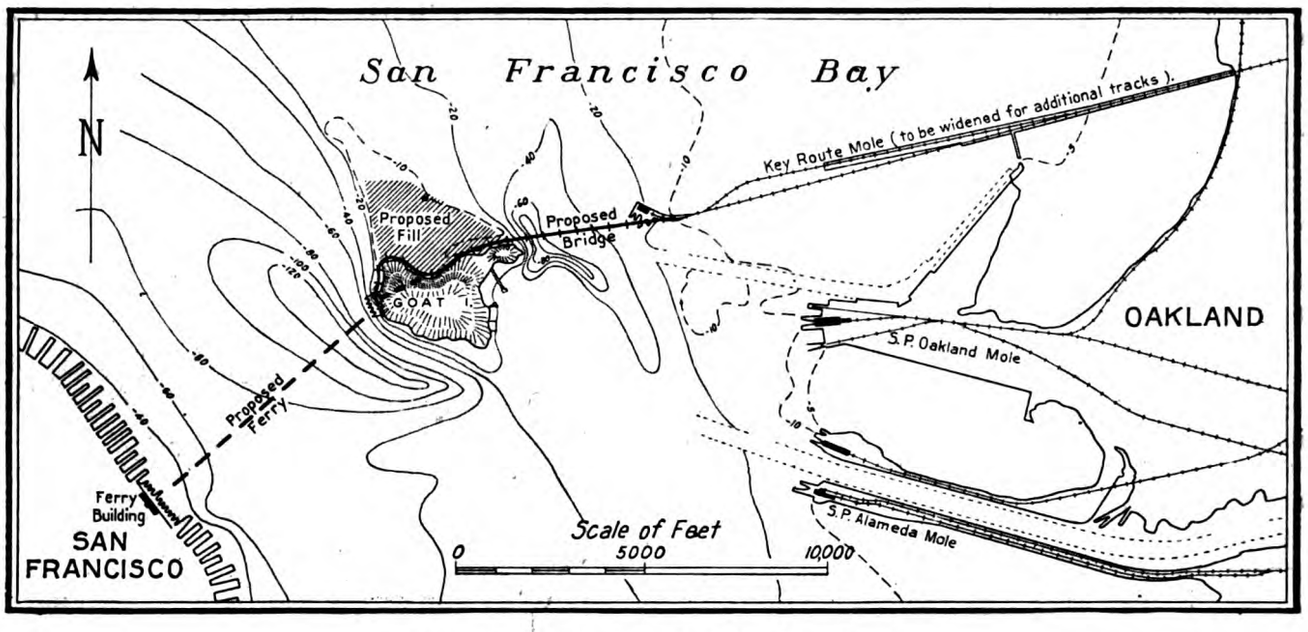

SKETCH SHOWING ADMIRAL JAYNE'S PROPOSAL

The Proposed Goat Island Terminal

The plan proposed by Rear Admiral Joseph L. Jayne, who has just been transferred from the position of commandant of the Twelfth Naval District, for a ferry terminal at Goat island is a matter of interest, not only to residents of the Bay district, but also to all inhabitants of the Pacific Coast States, most of whom come to San Francisco at one time or another.

Admiral Jayne's proposal, briefly, is this: To erect a steel trestle from the end of the Key Route pier to Goat island, the real name of which is Yerba Buena. This trestle is to be high enough to allow the passage of small vessels. The island is to be pierced by a tunnel through which trains will pass to a site to be graded on the western side, where a union station will be placed. This terminal will have facilities ample for the transcontinental railroads as well as the suburban cars. Docks will be built here, and from them the ferries will ply to the San Francisco landing, only a mile and a quarter distant, as against the present ferriage of three miles. The island is the property of the Federal government; as early as 1869 the Southern Pacific Railway company tried to obtain the use of it for a terminus, but as has too frequently happened before and since, the residents of the Bay district failed to pull together, and thus killed whatever chance there might have been at that time of the Federal government agreeing to permit the use of even part of the island. The accompanying sketch shows the principal features of the Jayne plan.

Plans for effecting improvement over the present system of ferry communication have been proposed from time to time. In 1916 a hearing was conducted at San Francisco and Oakland by a Board of Army Engineers, where the proponents of many plans explained them in detail. Of the projects suggested at that time, the one proposed by Charles Evan Fowler for a high-level bridge between Goat island and Telegraph hill would fit in best with the Jayne project. In fact, the Jayne project is practically the Fowler project without the high-level bridge. Other plans for tunnels and for low-level bridges were brought forth at the same time, but none of these bear much relation to the Jayne project. In fact, on account of the deep water shown in the sketch between Goat island and San Francisco, it would seem that steep grades would prohibit a tunnel between these points. A tunnel, furthermore, could not provide satisfactorily for automobile transportation, an ever-growing factor in the problem.

The principal advantage of the Jayne plan itself, without either bridge or tunnel, would be in improved arrangement of terminal facilities for both local and through service. The man in the street over-estimates the reduction in time for the commuter. The present schedule on the Southern Pacific boats is eighteen minutes, three or four of which are consumed in getting under way and in stopping. This leaves fifteen minutes at the outside. Reduction of the distance by a little more than half might cut this time to as little as six minutes, making nine minutes for the entire trip, a saving of nine as compared with the present schedule. But the connecting trains will require at least four minutes for the nearly two miles that would be added to their run. Consequently, the net saving in time could not exceed five minutes, and might be even less. This is for the Southern Pacific. The comparison with the Key Route would be less favorable yet, as the boats have a slightly shorter run at the present time.

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Perhaps the most interesting thing about the Jayne plan is its exhibition of an attitude of mind that is in refreshing contrast to one that is only too common among Government bureaus and officials, namely, to hold everything and grab a little more. Here, however, we have a high Government official saying, in effect, "This is a piece of property that the Government owns, which is more than adequate for its present and future needs. Let us therefore see if the property can also be used to serve the special needs of the cities in the vicinity". Even if nothing comes of the plan, the incident will be a pleasant one to remember.

ALL was rush and hustle in the studio when the new producer began to get busy. He snapped and barked and roared; but, certainly, he got things done, and that was the main thing.

Then he turned suddenly to the weary star, who was resting after the last stunt.

"We'll begin on the next episode now," he said briskly, while the actor groaned. "It ought to be a thriller. You're blown up in the air by an explosion, and an aeroplane rushes along catches you and carries you away.

"It does, does it?" exclaimed the actor. "But look here. Supposing something happens to the aeroplane, and it isn't there?

But the film producer's thoughts were already away ahead.

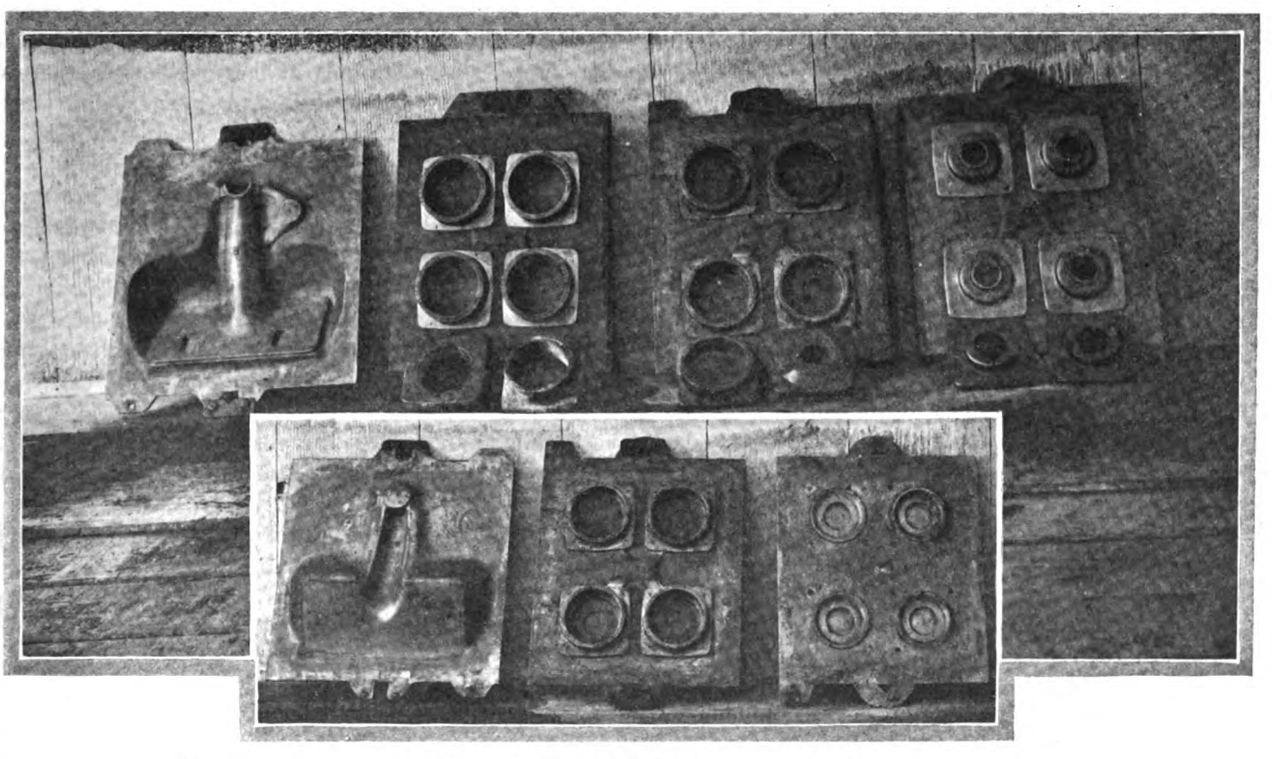
"Oh, that's all right!" he snapped absent-mindedly. "In that case, just come down; don't wait for it!"—'Los Angeles Times.'

Increasing Production of Truck and Tractor Parts by Suitable Pattern Equipment

At the foundry division of the Fageol Motors Co., the prices at which castings of the various truck and tractor parts are charged by the foundry to the other departments were fixed some years ago, and have not since been revised upward to correspond with advancing costs of labor and material. To meet these conditions and still to show a balance in the right colored ink requires that every possible advantage be taken of labor-saving methods. Nowhere is this more important than in the pattern-making department.

In the accompanying illustration, at the extreme left of both rows is shown both sides of the aluminum plate-pattern for the steering-column bracket for the Fageol truck. This casting used to be made with cores and the output was low, about five or six per day. This has been raised to thirty or forty and a better casting is obtained. The illustration also shows plate-patterns for the cage-cap for the front bearing of the main drive-shaft of the truck, the main spline-shaft, and the cage for the rear bearing of the counter-shaft, the respective castings being shown below the corresponding pattern from which they were made.

A noteworthy feature of this work is that most of the molding is done by men that knew nothing about foundry work a few months ago, but whose present output on this class of work compares favorably with what would be obtained by the average skilled molder in most foundries today.



PATTERNS USED AT THE FAGEOL FOUNDRY

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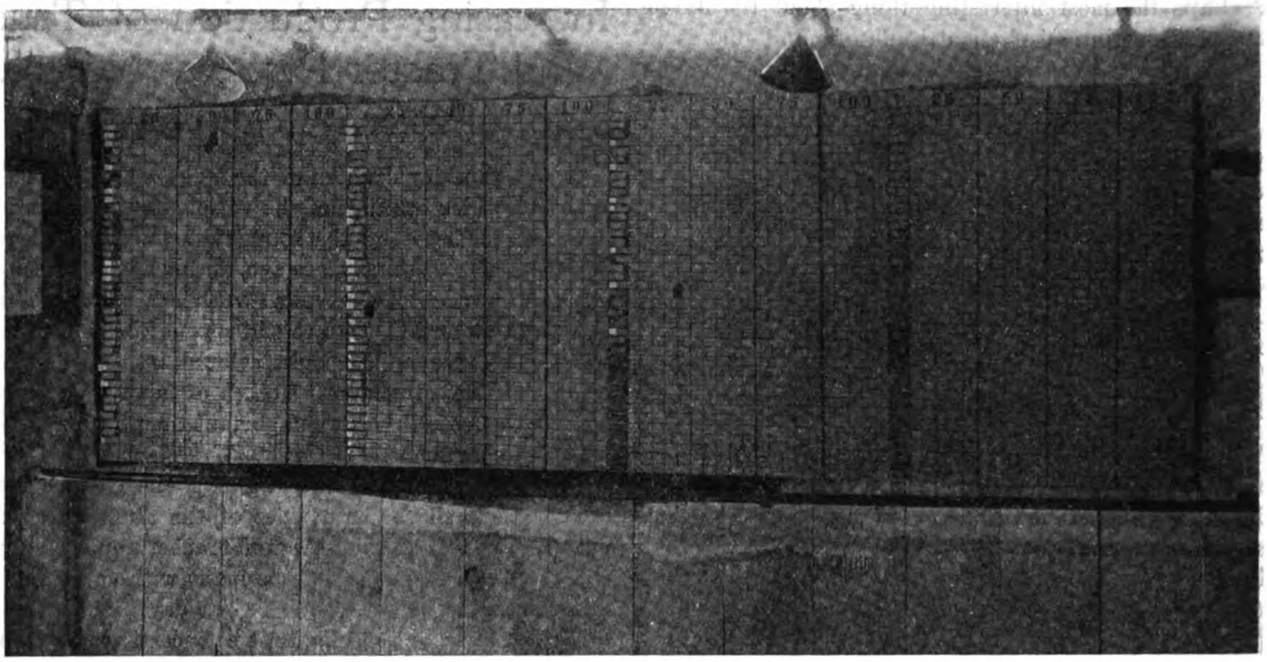

PRODUCTION-BOARD AT FAGEOL FOUNDRY

Keeping Track of Production at Fageol Foundry

The accompanying illustration shows the production-board used at the Fageol foundry. The foundry manufactures and furnishes to the main Fageol factory about 100 different castings for truck and tractor parts. The vertical rows of figures gives the part numbers of the various castings. Below each part number is the number required to be furnished during the month. For castings that are to be given the right-of-way, a different colored crayon is used to mark this number than for the other castings. For each casting there is a row of 100 holes, divided into fives by heavy vertical lines, and into twenty-fives by the heavier lines headed by the numbers at the top of the board. If seven from a particular casting are poured on the first day of the month, a white peg is placed in the seventh hole from the extreme left, and is advanced from time to time as additional castings are made. A red peg indicates 100 castings. Thus a red peg in the sixth hole and a white peg in the ninth hole shows that 609 castings have been completed. If there is no number in crayon below the part number, it indicates either that none of this part are required during the current month or else that the number required on the schedule has been delivered.

A red tag hung on the peg indicates a rush order for that particular part. Details regarding the order are noted on the tag. Tags of other colors are used to show other special conditions, such as a temporary withdrawal of the pattern for re-designing the casting. At the left of the production-board is a glass case containing a complete typewritten list of the names of the various parts with their corresponding numbers, also a list of the sizes and the numbers for each size of the snap-flasks available. This case is a little thing but it saves both foremen and superintendent a lot of time and conversation.

WHEN the Southern Pacific main line was built down the San Joaquin valley, a subsidiary company was formed to plat town-sites at regular intervals along the railroad, care being taken that each site should be on a section included in the grant to the company. Since railroad stations were established only at these town-sites, there was little likelihood of any competing towns being started. From time to time, the lots in a particular site were placed on the market.

When a certain one of these town-sites was thrown open to the public, a little more than the usual ceremony was observed. There was an auction, there was a band, there was a barbecue. Naturally, under these conditions, many of those attending the auction came more to have a good time than to invest in real estate. A youth belonging to this class became what Jack London used to call 'pleasantly jingled', and extremely talkative. He was not bothering anybody but the auctioneer, but he bothered him a whole lot. Finally the auctioneer could stand it no longer and said:

"Young man, if you would save the money you are now spending for vile liquor and invest in one of these lots, you would be far better off."

His tormentor gathered his wandering faculties with an effort and replied:

"Oh, I don't know. I'll be all right in the morning. These fellows never will get over it."

What makes the story particularly interesting is the fact that events proved he was right.

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Duplexing Electric Furnace and Cupola to Reduce Sulphur in Cast-Iron

In a paper presented at the Columbus meeting of the American Foundrymen's Association, George K. Elliott, of the Lunkenheimer Co., of Cincinnati, after alluding to two papers written by him last year along the same lines as the above title, continued, in part, as follows:

Sulphides in cast-iron break up the metallic continuity of the mass by freezing last, thereby being able to collect in veins along the joints between adjacent crystals of iron. This is true even of such a small amount of sulphur as 0.05% or less; but we are not concerned with such slight effects. However, when the sulphur content of cast-iron is more than 0.05% it shows a remarkable tendency to segregate in spots in a way that is likely to increase the harmful effects beyond all numerical proportion. A sulphur content of 0.15% will harm cast-iron through the increased tendency to segregate more than three times as much as will 0.05% sulphur. This tendency to segregate constitutes the greatest menace of high sulphur. Some foundrymen are learned, experienced, and clever enough to make occasional high-sulphur castings in which the sulphur is uniformly distributed throughout the metal; in such cases there always is widespread wonder at the unexpectedly good quality of the metal so rich in sulphur. Here the word 'good' is used advisedly and only relatively. Except when certain well-defined qualities such as hardness are required and can be attained in no other way, a low-sulphur iron will outshine a high-sulphur one when the full inventory of really worthy qualities is taken. By low sulphur I mean from 0.05 to 0.075%, or sulphur scanty enough to be incapable of serious segregation.

The increase in the harmful effects of sulphur is more rapid than the increase in the quantity.

However, the basic electric-furnace process, 'duplexed' with the cupola, often produces sulphur so far below 0.05% that the question is raised as to the advantages accruing from sulphur as low as 0.020%, for example. I can recall one heat that emerged from the tandem process with the sulphur so far eliminated that it took a gravimetric analysis in the laboratory to discover the 0.009% that constituted the remnant. It must be admitted freely that in the present state of testing and measuring the qualities of cast-iron, we are unable to fix positively any pronounced advantage in gray-iron castings with 0.015 or 0.030% sulphur, over those with twice those amounts of sulphur. However, there is a sort of speculative satisfaction and assurance in knowing that limits can be and are achieved in everyday practice that certainly are safe beyond all shadow of doubt; that the danger line at least is put a long way off. Possibly a more material advantage in this extremely low sulphur is the fact that the degree of de-sulphurization can be taken as a reliable gauge of the amount of general refining that has taken place in the metal bath, having in mind particularly de-oxidation and de-gasification.

Another indirect but significant benefit derived from low sulphur in cast-iron is independence of high or moderately high manganese. One of the reasons for the presence of this last element in cast-iron is the neutralization of the evil effects of sulphur, through preventing the formation of pernicious iron sulphide by forming manganese sulphide in its stead. Frequently iron is over-dosed with manganese merely to take care of anticipated high sulphur and the surplus manganese is often sufficient to increase the hardness and correspondingly decrease the machinability of the castings. If the metal is known to be low in sulphur, the manganese may be used more sparingly, with a saving not only of manganese but of machine-shop finishing costs. It has been noticed that iron refined in the electric furnace with low sulphur is harder than cupola iron of the same silicon, combined carbon, and manganese content and higher sulphur. This probably is because the manganese, relieved almost entirely of the charge of policing that bad character, sulphur, is released to other activities and so goes to work forming double carbides with iron and carbon, which have the effect of increasing materially the hardness of the metal. Theoretically one part by weight of sulphur unites with 1.7 parts of manganese to form 2.7 parts of manganese sulphide; that is, 0.12% sulphur will unite with 0.20% manganese to form 0.32% manganese sulphide. Assuming then that we have an iron with 0.80% manganese and 0.12% sulphur, at most only 0.60% manganese is available to form carbide and harden the iron. If, however, the sulphur is reduced to 0.02%, only 0.034% manganese is needed to take care of it, leaving 0.766% manganese to form carbide. This represents an actual increase in manganese carbide of over one-fourth. Surely, so great an increase is not without some effect upon the hardness. To retain no more than the hardness derived from the manganese carbide of the original iron having 0.80% manganese and 0.12% sulphur, the manganese would need to be only about 0.63% if the sulphur is reduced to 0.02%. Differences in hardness such as are illustrated in the preceding example probably would not be measurable or even noticeable in large castings, but they are distinctly manifest in small ones. This question of hardness is intermingled with the closely related subjects of the increased attraction of high-manganese irons for carbon, and of the protective influence of high manganese against oxidation in the cupola.

Where the sulphur content has been lowered by the use of the electric furnace, a smaller amount of manganese is needed than if the sulphur content is greater.

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Instead of striving for, and accomplishing, the low-sulphur limits that have just been mentioned the more popular practice probably will be to resort to the use of more scrap or of pig-irons running higher in sulphur, for example, making mixtures coming from the cupola with 0.120 to 0.150% sulphur or even more, and by duplexing in a basic electric furnace reducing that element about one-half. In the finer grades of iron-foundry work, so great a reduction of sulphur as this would show benefits that would be practically demonstrable. It is undeniably possible to improve the general qualities of really high-sulphur cast-iron by desulphurization. Here we have a distinctly useful application of the basic electric furnace for rendering fit for service scrap that normally is more or less unfit on account of its accumulation of sulphur.

'Duplexing' electric furnace and cupola makes it possible to obtain good castings from high-sulphur scrap and pig.

The chief process used for desulphurizing iron and steel in the electric furnace may be set down in the chemical reaction

$$FeS + CaO + C = Fe + CaS + CO$$

or

$$MnS + CaO + C = Mn + CaS + CO$$

It is probable that the full reaction or sequence of reactions is more complex than here shown, although the given reaction represents the essential outline of what takes place. The sulphur is removed from the metal bath as calcium sulphide, which is soluble in the slag and not in the iron. A reducing condition is necessary for the success of the reaction, for were the furnace atmosphere oxidizing in nature, the calcium sulphide would quickly be concerted into sulphate and as such in turn would react with the iron to form once more iron sulphide, which was the original compound of the sulphur in the iron and so would re-enter the bath. From the reaction we see that carbon is required in addition to the lime in the slag; indeed the presence of some calcium carbide (CaC_2) in the slag is required to ensure that the bath is in the essential deoxidized condition without which the elimination of sulphur is impossible. This is obtained by throwing powdered coke over the not too thick or viscous slag covering the bath.

In closing I wish to emphasize the reducing or deoxidizing nature of the reaction by which desulphurization is accomplished in this electric-furnace process. By it, getting rid of sulphur is made a double blessing; and who knows what and how many of the virtues of basic electric-furnace iron are in reality due not only to low sulphur but also, and perhaps to a much greater degree, to the chemically deoxidizing influences by which it has been refined?

"I DON'T LIKE these photographs at all," said the customer, "I look like an ape."

"You should have thought of that before you had them taken," said the photographer calmly.

Dame Nature v. the Engineer*

By W. F. SCHAPHORST

Nature is often called Dame Nature, which means that Nature is a woman. I believe it because woman can't be understood and neither can Nature.

For example, wherever you go or whatever you do you invariably have to fight for what you want. Nature has a tendency to give you the opposite of what your heart craves.

Piston-rods and cylinders are made nice and smooth in the first place and it is our desire to keep them so, but little old Dame Nature takes a hand in the affair and does all she can to make piston-rods and cylinder-walls rough. Same is true of bearings, valve-surfaces, the rails in our railways, and so on ad infinitum.

On the other side of the fence we have friction-drives that were made rough in the first place, but Dame Nature is opposed to roughness there just for the sake of contrariness, and lo and behold, the surface soon becomes smooth. A file is made rough, but does it stay rough? Even gears have a tendency to wear smooth. Mother Nature sometimes tries to make gears smooth by breaking the teeth off. Often, you see, she is hasty and doesn't use good judgment.

If you want to keep a thing sharp, you can't do it without constantly opposing Nature. If you want to keep a thing dull, look out or it will get sharp.

Nature is a woman, without doubt.

KELLY had drawn a summary for being absent from post while on guard duty.

"Where were you," demanded the judge-advocate, "when the sergeant of the guard passed just in front of your post?"

"At the rear."

"Where were you when the corporal passed just behind it?"

"At the front."

"And now," triumphantly, "where were you when the sergeant and the corporal walked around your post from opposite directions without seeing you."

"Judge," said Kelly, hopefully, "that's just the question that's been worrying me. Where was I?"—American Legion Weekly.

"SUPPOSING I give you your supper," said the tired-looking woman, "what will you do to earn it?"

"Madam," said the wanderer, "I'd give you de opportunity uv seein' a man go t'roo a whole meal widout findin' fault wid a single t'ing."

The woman thought a minute and then told him to come in and she'd lay the table.—Los Angeles Times.

*From 'The Excavating Engineer'.

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Promoting Soundness in Cast-Iron by the Addition of Various Metals

In a paper on 'Zirconium in Cast-Iron', presented before the Columbus meeting of the American Foundrymen's Association, Richard Moldenke had the following to say regarding deoxidizing agents in general:

For cast-iron the elements involved may be divided into two groups. The first is composed of those not readily removed by oxidation in ordinary good foundry melting-practice. The second consists of the elements readily oxidized under conditions involving the presence of oxygen in the molten metal. The two groups shade into each other to some extent, depending upon the degree of skill possessed by the foundryman in handling his cupola or furnace.

The above will be better understood when such elements as sulphur and phosphorus are considered. Both are increased in melting-practice as a result of concentration, as they are not removed by oxidation. Only the action of a basic hearth in open-hearth or electric-furnace practice will reduce these elements in quantity, and only through rather complicated chemical reactions. On the other hand, silicon, and manganese undergo definite losses in the melting-operation, and mixtures are calculated accordingly. The behavior of carbon and of iron itself is less certain. Both oxidize under conditions of high heat and the absence of a sufficiency of manganese and silicon to protect them. Most foundrymen have seen the brown smoke emanating from a cupola, indicating a low bed and burned iron, when the silicon of the mixture was below 1% and the manganese nearly all gone. In air-furnace practice the reduction of carbon is well known, and in long heats there is enough iron oxide in the bath to yield defective castings.

From the many tests made by me of deoxidizers of cast-iron, it seems that the first effect is the removal of oxygen present in combination with the iron. If the alloy added brings in more than enough for this deoxidation, the remainder of tht element stays in the iron and exerts its particular function upon the properties of the casting. Thus, the addition of, say, 0.1% titanium may remove all the oxygen present in a ladle of molten iron and yield results that are practically as good as if 0.2% titanium had been used. It is the removal of oxygen, the weakening factor in the molten metal, that permits the latter to come out with its natural strength due to its composition. Fundamentally, the less oxygen present in the metal before the ferro-alloy addition, the more characteristic the effect. Hence the soundness of the policy of devoting every attention to good melting-practice so that but little of an expensive alloy need be added to attain a desired effect.

If the alloy is added in larger quantities than is needed to accomplish deoxidation, the remainder stays in the iron and exerts its particular function upon the properties of the casting.

For the group of the less easily oxidized elements in cast-iron, where melting is carried on under the best possible conditions of air supply to the fuel to prevent undue oxidation, the following list may serve. The order given is believed to be that of the most stable first, and so on to the middle ground, as follows: phosphorus, sulphur, iron, copper, nickel, tungsten, molybdenum, and carbon. Then from carbon the order of the elements readily oxidized is probably carbon, chromium, zirconium, silicon, manganese, vanadium, aluminum, magnesium, titanium, and cerium.

One of the difficulties found in the deoxidation of cast-iron is the degree of heat required. It is well known that the hotter the metal the better the effect of manganese added to heats with a large proportion of steel. Indeed, to get a high steel-scrap heat safe for pouring molds, it is necessary to use a large amount of fuel. The resultant higher temperature of the molten metal promotes the union of oxygen and manganese, and the castings are free from blow-holes. With ordinary cast-iron the added manganese, instead of going into the slag, will be found in the metal; possibly partly in combination with sulphur, but having exerted little or no deoxidizing effect. The temperature was not high enough for the reaction. Consequently, such metals as aluminum, cerium, and magnesium are easily taken up in molten cast-iron, whereas titanium and zirconium take more time and heat for the best results.

Elements, such as aluminum, that require only a relatively low temperature to become oxidized are easier to use than those that call for a higher temperature.

OLGA NETHERSOLE never tired of telling the story of an experience on the road playing Sappho. You remember that the famous scene was that in which the hero and heroine confess their mutual love and the hero picks up the girl and carries her upstairs.

Now Miss Nethersole is not fat but at the same time she isn't a featherweight, but this could not be helped on a certain night when both the leading man and his first understudy were ill. Another chap, about the size of Billy Rock, played the part.

He got along fine until it came to carrying Olga up the flight of stairs. Try as he would, he could not lift her off the floor. The audience waited spellbound, wondering if he were going to lose out. It seemed as if he were weakening when a voice from the balcony shouted:

"Take it easy, old man. Just take what you can, and come back for the rest."—Los Angeles Times.

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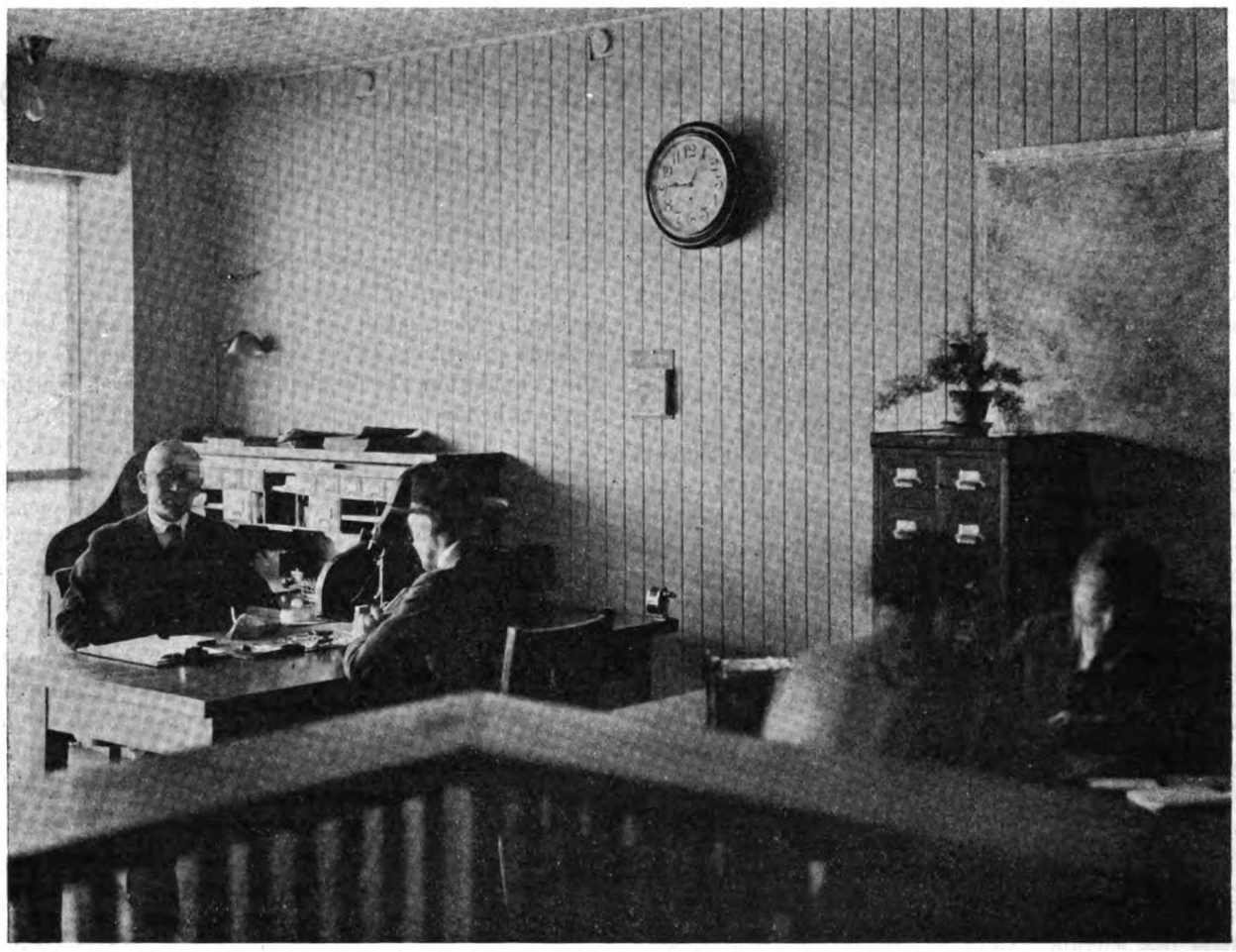

INTERIOR OF METAL TRADES EMPLOYMENT OFFICE. MR. M'LAUGHLIN ON LEFT (FACING THE CAMERA). MR. MIBACH ON EXTREME RIGHT (ALSO FACING THE CAMERA).

An Employment Office Founded on Service

The establishment of a centralized employment office has been desired for some years by several of the progressive members of the California Metal Trades Association. In fact such an office was opened a few years ago by the secretary, Fred C. Metcalf, but various difficulties compelled its discontinuance before it had more than got fairly started. The present office is an outgrowth of the strike of a year ago.

When, about the middle of last November, the members of the Association decided to re-open their plants, after a shut-down of several weeks, the first essential was to determine how many men, either former employees or others, would go to work in the shops and yards under the so-called American plan, which had been selected to govern relations between employer and employee. To aid in determining this, a 'registration office' was opened in the Sheldon building, and several full-page advertisements in the daily papers invited men that wished to go to work to call at this office and leave their names. P. F. McLaughlin, formerly of the employment department at the Union plant of the Bethlehem Shipbuilding Corporation, was placed in charge. Mr. McLaughlin was at the Union plant throughout the storm and stress of the War, when thousands of men were hired every month.

The original expectation had been that, after the yards and shops had got into operation at approximately full force, the registration office would be discontinued, but long before that time arrived, the advantages of a central employment office to both employers and workmen had become evident even to members of the Association that had hitherto been opposed to the establishment of such an office. Meanwhile, it became increasingly evident that, while a room or two where men could come, be interviewed, and go out, together with a place to keep records was all very well in its way, additional facilities would increase the usefulness of the office to all concerned. In order to obtain the necessary space, the office was moved to 41 Drumm street, where it occupies the whole of a two-story and basement building.

Entering the building, the first impression of the visitor whether he is looking for a job or not, is that the place is clean, not with the immaculateness that makes a

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fellow feel uncomfortable, but rather as neat and orderly as any business office in town. On the ground floor there are benches to accommodate applicants waiting for an interview, and lockers for the safe-keeping of mechanic's tools. This feature is particularly appreciated by the men that are either without a job, or that are employed on short jobs in various places, and that have no other convenient place to keep their tools. When a man first comes in, he leaves his tools and gets a check for them. In the basement there are smaller lockers for any other valuables that a man may have. In fact, as will be further seen later in this article, the office incorporates a number of service features without the man desiring such service being compelled, or at least expected, to pay for it.

Up one flight of stairs, on a sort of mezzanine floor, is

THE OFFICE BUILDING

the employment office proper. This consists of an anteroom with seating accommodations for about a dozen men, and a larger room for interviews, equipped also with desks, table, filing cabinets, etc. Each man is interviewed individually. When the anteroom is emptied, a 'buzzer' on the first floor is rung, and another dozen men come upstairs. The system is so simple that the men understand and follow it without explanation.

At the present time the shipbuilding companies of the district all maintain their own employment departments at the respective yards. However, even the shipyards hire a large proportion of their men through the central office. This is particularly true for men with special skill. A yard might, for instance, have to wait a week or more for a good welder to turn up at the gate, although a requisition to the central office would very likely be filled the same day. The commercial shops and smaller plants generally do most of their hiring through the central office, although, of course, if a satisfactory man happens to apply at the gate, he would be hired and the central office notified of the filling of the vacancy. All shops refer men they cannot place or who are laid off to the central employment office. However, as the existence of the central employment office becomes better known, both in the Bay district and all over the country, the custom of applying at the gate becomes less and less common. On the other hand, a man can go to an easily accessible office and learn immediately if there is a job open in his line in any of the approximately 150 plants, members of the Association. On the other hand, he may visit 50 plants fruitlessly, and return home, tired and disgusted, when the fifty-first plant, which he did not visit, might have just the job open that he wanted. The specially-skilled man, naturally, appreciates most this advantage of the central employment office.

There is another factor, largely psychological, but none the less important, that tends to make the man looking for a job prefer to go to a central office, particularly if he is already acquainted with the procedure followed. Such a man feels no more hesitation about going there to get a job than he would about going into a store to get a necktie. It is a business transaction in either case. When he leaves the office to go to a plant to see about a job, he carries with him a card that is virtually a letter of introduction. How many salesmen, no matter how good the line they represent, would not prefer to have a letter of introduction when meeting a purchasing agent with whom they were not acquainted? The mechanic and the salesman are both made of the same kind of stuff, only the former is even more likely to be diffident.

The principal facts about the man interviewed, such as name, age, trade, place last worked, and whether an American citizen or not, are recorded on a card, which is filed in the office. Each morning, before opening the office, a list is prepared from the requisitions for help received from the various plants, showing the number and kind of jobs open in all plants operated by members of the Association. When a man is sent to a plant, he is given a card, containing the principal information already noted, which serves as his introduction to the man in charge of employment at the plant. Space is also provided to indicate whether the man is hired or not, and if he is not hired, the reason. This card is returned by the plant management to the central employment office and filed. These two sets of cards constitute the principal records of the office. The work of the office is done by Mr. McLaughlin and his assistant, A. A. Mibach, also an experienced employment man. About half the time of one of the stenographers employed at the main office of the Association is also required.

On the second floor of the building is a large well-lighted reading room, supplied with newspapers and magazines. There are also several tables for cards and checkers, also writing materials. In fact, this floor provides a clubroom for the metal-trade worker that happens to be out of a job.

Plans are under consideration to provide grinding equipment in the basement, together with other facilities

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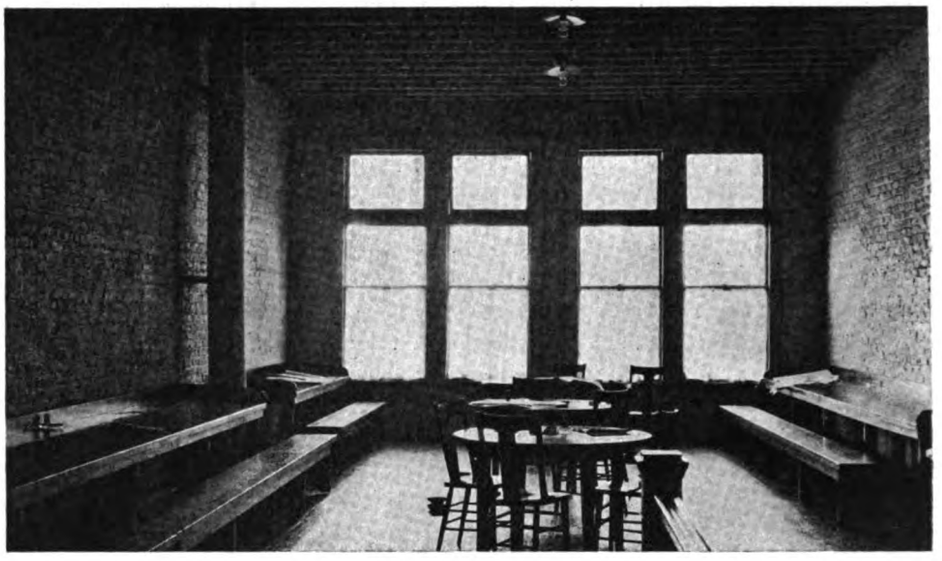
to enable the men to keep their tools in shape. The office has been the means of placing over a hundred foundry apprentices and about the same number in the other trades in shops of members of the Association during the past few months. Mr. McLaughlin pays particular attention to this branch of the work, and takes great care to make sure that a boy is suited mentally and physically to the trade he is about to learn.



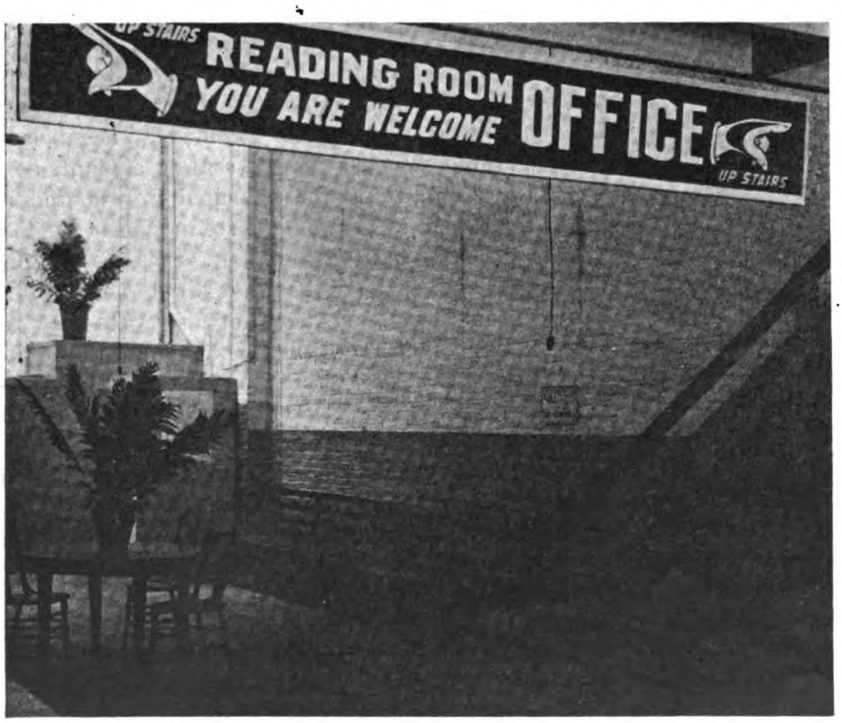
ONE END OF THE READING-ROOM

On an average about 400 men per week are placed in jobs. Preference is given by the Association members to the man that is an American citizen or has at least taken out his first papers. While no record on this point has been kept, this requirement has probably been the indirect cause of persuading over 500 men to take out their first papers, and every assistance is given to the men in taking this first step toward Americanization. In selecting men for jobs, efforts are made to give preference to the steady worker as compared with the 'floater', so as to keep the labor turnover as low as possible. Apart from the various general sociological and moral advantages, the direct saving to the employer of a low labor turnover are seldom appreciated.

That some of the other facilities provided at the employment office are appreciated is indicated by the fact that from 50 to 100 sets of mechanic's tools are kept in the lockers. From 30 to 40 men are frequently found in the reading room.

In connection with the handling of such a large body of men, it is natural at times that grievances arise. Here is where a little judgment and spirit of fair play on the part of the interviewer makes it possible to send the man back to the shop a contented workman or to another job or shop where he is better fitted to do the work.

In the administration of the office, no discrimination is shown as to race, creed, or affiliation, and no charge is made for any service, the only requirement being that the men show the same courtesy and fair play that is given to them. The various results already mentioned have been attained under difficult conditions within a few months, and are therefore all the more gratifying. Still greater results should be accomplished in the future as the men gain a knowledge of, and confidence in, the service.



GROUND FLOOR OF OFFICE. (DID YOU EVER SEE FLOWERS IN AN EMPLOYMENT OFFICE BEFORE?)

"They say that stolen kisses are the sweetest," he said, as they sat on the piazza looking at the moon.

"Indeed?" she said.

"Yes. What do you think about it?"

"Oh, I have no opinion at all, but it seems to me if I were a young man I wouldn't be long in doubt whether they were or not."—Boston Transcript.

"If you desire, we can furnish a funeral for very little money," reads an undertaker's ad.

One should be careful how he makes enemies.

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Foundry Engineering

In a paper presented at the Columbus meeting of the American Foundrymen's Association, Frank D. Chase, of Frank D. Chase, Inc., of Chicago, said in part, as follows:

Conceding that competent engineers and architects can design buildings that will meet the requirements of satisfactory working conditions, this element represents only part of what is needed in the layout of a foundry designed and equipped so as to accomplish the economies that are possible, and which are usually overlooked. It is essential that every production possibility in all departments be developed to its utmost. This means an intelligent study and analysis of every production element and a comprehensive provision for the use of labor-displacing equipment that will permit maximum output per man.

This contention may be illustrated by specific examples in every phase of foundry operation, from the receipt of raw materials to the shipping of the finished casting. In the gray-iron foundry, consider the methods by which raw materials are handled from the cars, and charges from the yard to the cupolas. In general, the same methods are in vogue that have obtained since the first foundry was built. Shovels and wheelbarrows have persisted, and there has been no improvement in the design of either. Pig-iron and scrap are usually man-handled all the way from the cars to the cupolas. Sometimes the small tonnage involved does not justify equipment that will effect improvements over old methods, but where the volume of material does warrant mechanical equipment, the possibilities have only been touched. On the foundry-floor, where any quantity of heavy flasks or castings are to be handled, a crane is immediately suggested. How much consideration has been given to the use of a crane serving a charging-floor, where it could be used as a charging machine, and also to eliminate the labor of moving loaded cars or boxes? It would give a flexibility not attainable in the usual charging-floor layout, even though it be provided with industrial tracks and ball-bearing charging-cars.

For handling raw materials the same methods are generally used that were in vogue when the first foundry was built.

In the average foundry the handling of pig-iron, scrap, coal, coke, and sand from cars to yard and later to the point of consumption costs from 60 cents to $1 or more per ton, depending upon the weather and the particular conditions about the plant. The sand, coke, and coal are usually distributed by means of wheelbarrows using plank-runways. Pig-iron, piece by piece, is tossed on the ground and stacked laboriously, or use is made of a gravity-conveyor or skid, which still necessitates manual handling at each end. The making-up of charges and the reclaiming of coal, coke, and sand from the yard to the foundry is the expensive element of the operation. Rain, snow, and ice foul the turntables, transfer-cars, and industrial tracks. The cars themselves are seldom kept properly lubricated and in good condition. When such a system is used, the track layout is seldom sufficiently comprehensive; it only serves an area immediately adjacent to it, and necessitates the bringing, usually by hand, of all material from the piles to the cars. It has its value, but meets the requirements only in part.

Where the quantity of material handled warrants, a traveling crane supplemented by a magnet, grab or dump-bucket, and a coordinated bin-arrangement, gives the most economical results.

Where the quantity of raw material handled warrants the expenditure, the most economical arrangement is a traveling crane supplemented by a magnet, grab or dump-bucket, and most important of all, a coordinated bin-arrangement, the details of which can be so designed as to reduce to a minimum, all handling by hand. The electric or the gas tractor furnish a modern method of transporting practically every material in the foundry, even to hot iron. Their use is becoming more general, and some of our largest foundry layouts are developed around the tractor as the means of handling materials from one point to another throughout the entire plant.

Lack of foresight in the beginning is responsible for the high material-handling costs in many plants. The foundry has developed until the quantity of materials handled in the yard alone would make a heavy investment in cranes, bins, and other equipment profitable, but through lack of foresight, conditions have been allowed to develop that make it impractical, all things considered, to do anything but continue as in the past. The need for expansion and improvement becomes so acute that not infrequently it causes a decision to abandon the plant and build anew. Such a decision is sometimes an unfortunate one, and the engineer who combines the knowledge of building design with a knowledge of foundry operations can frequently save the old plant by making changes that will serve almost as well as the erection of a new building.

Lack of foresight in the beginning is responsible for the high material-handling costs in many plants.

Melting-equipment includes blowers, burners, furnaces, and fuels. Like everything else, these are undergoing constant improvements, and some types are increasing in their range of application. Fuel costs are being readjusted. The electric furnace, formerly considered in the foundry merely as a steel-maker, is now being used for non-ferrous metals and for malleable and gray-iron for high-pressure and for rigid-specification work. With power at 1c. per kilowatt-hour, steel castings can be made cheaper in the electric furnace than with the converter. The principal determining factor is the price of pig and scrap. Malleable practice and air-furnace melting has made little progress toward economies, with the exception

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of the recent success with powdered coal. Is it not surprising that the rigid requirements of malleable melting and hot-metal handling have not been more generally met by the electric furnace, particularly since the usual 45% pig charge for air-furnaces can be reduced to 10% in the electric furnace?

With current at 1c. per kilowatt-hour, assuming 650 kilowatt-hours per ton, there is a direct fuel charge of $6.50 per ton of metal melted. With a 2-to-1 air-furnace melting ratio and coal in the furnace costing $7.50 per ton, there is a difference of $2.75 per ton on fuel in favor of the air-furnace. However, a 45% pig charge at $45 per ton can be replaced by 10% pig and 35% scrap at $30 per ton. The fuel saving of $2.75 for the air-furnace is offset by a saving of $4.75 in the cost of the charge for the electric furnace, or, for these two items there is a net difference of $2 per ton of melt in favor of the electric furnace. For a strict comparison of the two methods, all the items must be taken into account, but the foregoing and most important are given to indicate that electric-furnace malleable has economic possibilities, which have not been fully appreciated. Consider further with the electric furnace the possibilities of using cupola metal in reducing the fuel or energy cost, together with the higher temperatures and more uniform analysis obtainable with it.

The use of the electric furnace for producing malleable iron has economic possibilities, which have not been generally appreciated.

The heart of production lies in molding. Here, if anywhere in the foundry, we should expect to find a proper degree of progress over the methods in use 15 years ago. But this is true only to a limited extent in the foundries making automobile castings or other specialties in quantities. In general, it is only the heavier tonnages in specialties which make possible and economical the installations of sand-handling and mold-conveying equipment on a large scale, but a number of other combinations of less expensive equipment can be used to reduce the labor of shoveling and cutting sand and handling flasks to, and molds from, the machines. The last mentioned elements do not, of course, apply to snap or other small-flask work, but the main crane equipment is seldom sufficient to enable the molders to work without tie-ups waiting for lifts and to close.

Progress in methods of molding during the past 15 years has been limited mainly to foundries making automobile castings and other specialties in large quantities.

The complaint of every foundryman nowadays is that good mechanics, all-around molders, etc., are not to be had, and yet an attempt is made to obtain production according to the old methods. Molding is ceasing to be a highly skilled trade. The average shop does not have a number of all-around molders, who can be depended upon to turn out a good casting from any pattern given them. The time was when a shoemaker or a cabinet-maker made a finished article from his raw materials, but modern production has no place for such methods. Wherever possible, each man now performs his own particular operation. The analogy is admittedly not rigid for the molder and the foundry, but it is proper to question some current foundry practices in the light of what is being done in other manufacturing lines.

In making a casting there is the preparation of a drag, a cope, finishing, setting of cores, closing and pouring, and sometimes the molder assists in shaking out, and cuts part of his own sand. In most cases, particularly for gray-iron and malleable, molding ceases when the first iron comes off, and the molders use an amount of productive time which might be cut in one-third if all could be kept busy at the operation, or if a separate crew performed the task. Closing-up is often delayed waiting for the crane, and the usual hunt at the expense of molders' time, takes place for clamps and wedges. And it is the molders who are scarce and whose daily output largely determines production! The inference is obvious, but it must not be inferred that a division of operations is applicable to all classes of work and conditions. There are, however, any number of instances where improvements in this direction can be made. Some of them, when tonnages are sufficient, necessitate or make possible continuous pouring. This operation requires careful analysis of methods of mechanical handling.

In most foundries, a division of operations, permitting molders to devote their entire time to molding, would be advantageous. This often makes continuous pouring advisable.

Here again the opportunities for the utilization of old plants is practically unlimited. We recently estimated that in a gray-iron foundry in New York, now running on a basis of pouring once a day, a change to continuous pouring is entirely feasible owing to the uniformity of the work, and that by the installation of the continuous pouring operation, with practically no increase in costs of equipment, building area, or capacity, an increased profit of approximately $200,000 per year could be earned. The total expense to obtain this was perhaps $25,000.

Where the several operations may be divided, frequently the pouring itself may be divorced from the molder, but a plan must be developed whereby the responsibility for scrap is fixed, particularly when the shop is being run on a piece-work basis. To be carried out most advantageously continuous pouring demands facilities for the removal of hot castings, and it necessitates a type of building construction that will remove adequately the smoke and fume and maintain a sufficiently cool working-temperature. The desired results cannot be obtaintd unless the heat-producing zones are considered when designing the building. Hot gas-laden air cannot be removed from a structure unless cool air is admitted in its place. Forced ventilation is to natural ventilation as artificial light is to sunlight. It is more expensive and a poor substitute.

The cleaning-room of most plants is another example of the extent to which old methods have persisted. Half

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the time required for cleaning a batch of castings in a tumbling-barrel is consumed by the loading and unloading operations. Castings, piece by piece, are laboriously raised from the floors and deposited into the mills, and the unloading operation is almost as inefficient. There are obvious economies possible in many cases with barrels, which are elevated and served by a platform at mill-height, from which a mill may be quickly loaded and emptied frequently direct into the boxes under the mill, without additional handling of each piece or the use of a shovel. But, as in the other cases, the usual building elevations, allowable truss loads, etc., do not permit of such arrangements because the structure was not designed primarily to fit the operations.

The proper type of building guarantees good light and ventilation, where the wrong type makes the building a difficult one to hold good men, and many other items of men's welfare must also be considered. Few industries offer more unattractive surroundings to labor than the foundry. This does not mean unhealthy surroundings, because foundry work is healthful, with the exception of the inhuman sand-blast rooms that still exist in some instances. The time has come, whether we are willing to admit it or not, that decent accommodations must be provided for workmen. There is much argument as to whether or not improved conditions are appreciated, whether they pay, and all that sort of thing, but the fact remains that men are entitled to better conditions than most of them get today, and that they are going to have them. In my opinion it is advisable to provide better conditions and to educate the men to appreciate them, thereby making them better men and citizens. This matter of employees' welfare is a life study in itself. The providing of proper wash-rooms, locker-rooms, toilet-rooms, rest and eating-rooms are all a part of the engineer's job.

Decent accommodations must be provided for working-men.

A MAN got in a cab at a Southern railway station and said:

"Drive me to a haberdasher's."

"Yaas suh," said the driver, whipped up his horse and drove a block; then, leaning over to address his passenger, said:

" 'Scuse me, boss, but whar d'yu say you wanter go?"

"To a haberdasher's."

"Yaas suh; yaas suh."

After another block there was the same performance.

" 'Scuse me boss, but whar d'yu say you wanter go?"

"To a haberdasher's," was the somewhat impatient reply.

Then came the final appeal:

"Now, look a-here, boss; I be'n drivin' in dis town twenty years, and I ain't never giv nobody away yit. Now you jes' tell this niggar whar 'tis you wanter go."—Los Angeles Times.

Domestic Graphite for Crucibles

Before 1915 nearly all the graphite used in crucibles manufactured in the United States was imported, chiefly from Ceylon, Madagascar, and Korea. Little domestic graphite was used, that mined being chiefly employed for the manufacture of paint, lubricants, foundry facings, and other purposes. Not only was most of the graphite imported, but also all the clay used in crucible manufacture, this clay coming from Klingenburg, Bavaria. Clay imports from Bavaria being entirely cut off, crucible makers had to turn to domestic sources of clay. The clay problem was soon well in hand, domestic clays being developed that compared favorably with foreign clays. The use of domestic flake-graphite in crucibles, however, mixed with imported graphite in proportions of more than 25% domestic was not attended with much success. However, the mining and milling of domestic graphite expanded rapidly under the pressure of war conditions. At the end of the War there were 39 graphite plants in Alabama, 3 in New York, 5 in Pennsylvania, and 3 in Texas.

BROWN was very fond of singing, and never missed an opportunity to display his talents in public, although it happened that his wife had never heard him perform, in fact, did not even know that he did so.

One evening they attended a musicale together, toward the close of which Brown was asked to sing, which he did. His wife said nothing but on the way home inquired:

"George, whatever made you get up and sing?"

"Why, my dear," he replied, "to give pleasure to the other guests."

"Oh, was that it?" she gave a sigh of relief, "I thought you were taking revenge on me for asking you to wait half an hour for your dinner."

OLD PORTLY found himself stranded for an hour or so in a strange town and decided to have something to eat.

He entered the only restaurant he could find and called for a menu.

"There ain't one, sir," said the waiter, who looked as if he'd been blighted in infancy, "but I can tell you what's on."

"Let's have it, then," said Portly.

The waiter took a deep breath and reeled off a lengthy list. "You have a good memory, my man," said Portly.

"No, sir," said the waiter meekly. "I just looked at the tablecloth."—Houston Post.

"GOT any property about here?" asked the tax-collector at the farmhouse door.

"Yes, I got a small lot," replied the buxom woman, with the gingham apron, who answered the knock.

"Where is it?"

"About two miles down the road from here."

"Is it improved?"

"Well, I got a husband buried there, but I can't say that improves it any."—Los Angeles Times.

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Labor's Opportunity

By An Occasional Contributor

During the past four years we have seen collective bargaining brought to its highest effectiveness through the power of the strike and through the shortage of efficient labor.

Organized labor of the present day is strictly an American development and like most things American it has its course to run, from the small and difficult start, through the steady healthy growth on principle, to the successful organization of the masses under able leadership, then on in its overgrown strength to the point where the majority of the public come to see that the principle for which the original organization stood has been forced into the background through greed, ignorance, and false leadership. Then once again the principle comes forward, the sincere followers and the able minds take control, and from the ruins of the past build a permanent monument to the living ideal, and through true leadership and right thinking make a monument that all will admire and support.

This is not alone the story of organized labor, it has been the history of our railroads, our power companies, our iron industries, our oil industries. In fact all the big ideas of modern business have had to run the same course. Look back for instance at our political parties, our State political organizations, we are now at last working toward the ideal on the principles on which our government was founded.

Union labor was founded on the principle that all men deserve a fair show, a living wage, and proper conditions under which to live and work. These are ideals which no man can deny are right in thought and action, but as the ideas grew and the better element of organized labor saw that the things that they asked were conceded they, the conservatives, felt that the work was well done, and what they had started in good faith would be carried on through the younger generation.

We all see now the mistake that was made. When the organization was complete or thought to be complete it was allowed to drift, and as happens in all business when allowed to drift, the worst element came into control. Such men are always on the lookout to take advantage of the other fellow's work. The able leader that we knew a few years ago was thrown into the discard, or made to become so radical that he would not know himself were it not that he still possessed a rubber stamp of his signature taken at a time when he was himself.

In the metal trades we have just seen the finish of one of the most unfortunate disagreements that ever took place between employer and employee, and the load of loss is falling on the employee for many reasons. This load is now heavy and unless matters are soon changed it will be heavier, until it reaches a point that he can no longer stand the strain, and then he will have to learn a new trade, or suffer a humiliation that few self-respecting men can or will stand. For a first-class able thorough machinist to acknowledge that he must go back to the early days of being a 'hand' where he has been a leader, or to acknowledge that he has for years been paying dues to an organization that has gotten for him nothing but trouble and idleness is a hard blow, and there are few employers in the shops today who do not hate to see these men made to suffer the indignities they now suffer and the humiliation that will be theirs when they finally do return to work.

Leadership as exemplified during the past three years has been a farce, as was apparent to all who cared to observe. The leaders, so called, secured the wages, conditions, hours, rules, etc., as fast as they asked for them. On this basis they continue to think themselves leaders, when in truth they have overplayed their hands and are, while still carrying the title, fallen from their grand estate. Among the few followers that they have left they still pose, but what can they do? No one will listen, no one cares, they are facing a condition like that of the Mexican government, all generals and no army.

The situation in the metal trades on the Pacific Coast is different from that in the East, but that difference will not last long unless labor men awaken and see that they are the ones that are forcing the conditions to change. The very change that labor fears most is being made at this time and because of the action of labor itself. Organized labor has always feared the 'specialist', the 'operator', and the 'piece-work' man, and these are the elements that are coming into the shops today. They are being welcomed with open arms by the shop-owners, and for no other reason than that the shop-owners cannot secure the skilled labor they need for the work in hand.

Another condition we have on the Pacific Coast is that most of the shops of any importance are run and owned by men who started 'on the floor'. They still love the able machinist and would rather have one real machinist in the shop than two operators at half the money. These men are gradually being forced into the background by conditions over which they have no control. They cannot hire the men they want, so they leave the hiring to others, and the result is that the real friend of the organized machinist is going out of the business never to return.

During the War there were heroes who never were mentioned, there were men who stood for indignities solely because of their patriotism, and these indignities were heaped upon them by the so-called representatives of organized labor. Organized labor did not select its delegates during the War. The delegates selected themselves, and they maintained an organization back of them that would do their bidding irrespective of results either im-

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mediate or in the future. These men made demands such that, were they made in normal times, or were the shop-owners in a position to suspend their work at a loss to themselves only, the latter would have not only told these delegates to leave, but they would have thrown them out by physical force.

You will hear of shops that yielded to the union demands. That is true, as we all know. Some of them had to do so or go to the wall, others because they leaned toward the union labor idea, others because their business was seasonal and the strikes came at a time when they could not close without going out of business.

Let us see how these shops have fared. There is one large shop that signed the agreement, keeping all old men at their jobs. This was fine and all union men cited this shop as a sample of fair dealing. Let us look at the other side of the fair dealing for a few minutes. Gradually a number of the men who were not very strong union men were wormed out by one means or another, and, as gradually, were wormed in all the agitators, organizers, insiders, and drones of the union until the shop looked like a union meeting on a strike-vote night at about one o'clock in the morning.

Organized labor has now reached the point that has been reached by so many business firms that have lived on their reputations. Such firms, which have held that their goods should sell on their name alone, argue that no salesmen are needed, only order-takers or men to go and tell the customer how much he can have and the terms that will be granted him. These firms have two ways of getting out of the hole, one is to close up and liquidate and the other is to present their goods in their best light and get the public to buy.

Union labor today has its back to the wall. It is the one organization that has a commodity that is always in demand, skilled labor, yet it cannot sell its product. Union labor today should fire its agitators, walking delegates, politicians, etc., and hire the best force of salesmen that money can hire. Instead of electing a radical or a man that is known as a trouble-maker let union members place in the highest office one of their many well-known able men, and let him carry on the business in a business-like way and place their product before the public in its best form.

What do we look for in the union man of today? Trouble, agitation, insolence, low efficiency, and curtailment of production. That is what we look for, and that is what we will find as long as labor is led as at present. With the above idea in mind, labor would do well to see that these impressions are corrected. It can be done but it must be done before it is too late.

To introduce the new union labor man as stated a good salesman is needed, but no salesman, however good, can sell a product unless that product will do what he says it will do and in the manner that he guarantees. When the salesman sells the service of three men to a shop let him see that three men such as he has described go to that shop, not three of the strongest 'insiders' or politicians. Make the three men an example and a reference for the salesman. These men do not need to kill themselves working, all that is asked of them, and all that has ever been asked of them is a fair day's work, and no one is better able than an able machinist to judge of what a real day's work should be.

With these men in the shop, able men, men who will not spoil work, men who will get a good return from the tools they operate, how long will it be until the shop-owner will want more like them, and how long will it be until all unorganized men in the shop will see that it means something to be an able man, and to carry a card of a union that will place men who know their business and see that they get fair treatment? If, on the other hand, there is no incentive to do good work, then it is only natural that the inefficient man will become the union man while the able man will strike out for himself.

Current American Shipbuilding

Statistics compiled by the Bureau of Navigation, Department of Commerce, show that on September 1 last, American shipyards were building or had under contract for private account, exclusive of Shipping Board or other Government work, 345 vessels of 1,236,547 gross tons. Of this amount, 187 vessels with a tonnage of 876,343 were credited to Atlantic yards, 41 vessels with a tonnage of 270,064 to Pacific yards, 13 vessels with a tonnage of 26,-260 at Gulf yards, 4 vessels with a tonnage of 8200 at yards on the Great Lakes, and 100 vessels with a tonnage of 55,680 at river yards. Of the Pacific Coast vessels, 23 with a tonnage of 140,832 were credited to the Bay district, 11 with a tonnage of 89,994 to the Columbia River district, 6 with a tonnage of 38,800 to Los Angeles, and 1 with a tonnage of 438 to Puget Sound.

"THE Mortons are a bit too English for us," remarked Bilkins. "They take the London papers exclusively, talk mainly about Chesterton and Shaw, and even have their windows stained foggy so that when anyone looks out through them the streets appear like those in London. However, that isn't why my wife and I stopped calling there. When their Anglomania developed to such a degree that they kept a large waste-basket standing in the hallway, that settled it."

"I don't see anything English in that," said Badger. "What was it for?"

"Oh, visitors were expected to drop their h's in it on entering the house."—Boston Transcript.

THE conversation around the long dinner table ended, as do most conversations nowadays, with the subject of spiritualism. The guests and the members of the family gave their opinions as to whether or not the dead could communicate with the living, but it remained for 'Sweet Sixteen' to present the only original thought on the subject.

"It's hard enough for me now to keep up my correspondence," she said. "When I die I want to rest."—Los Angeles Times.

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Prevention of Bearing Troubles*

When bearing trouble occurs, it is usually indicated by increased heat in the affected bearing. It will be instructive to analyze a number of the causes leading to heated bearings.

The oil should always be poured through a strainer into the oil-cans.

Dirty oil-cans are responsible for many hot bearings. The cans should be closed at the top or provided with covers, so as to prevent as far as possible the entrance of dirt. A can should never be used for more than one grade of oil, and, in order to prevent mistakes, the name of the oil should be plainly marked on the can. When the oil is drawn directly from the barrels for use, the overflow runs on the floor or into 'save-alls' which are not always clean. There is always the danger that some of this oil, including the dirt, will be used for lubrication. It is good practice to keep the oil in cabinets, preferably locked, so that unauthorized persons will not tamper with the oil. Oil waste may thus be minimized.

Cans should be kept clean, and should never be used for more than one grade of oil.

Numerous hot bearings have been caused by the use of the wrong oil. If, say, a spindle-oil is used instead of an engine-oil, heating will follow because the oil is too light in body to provide lubrication. If a heavy oil is used in place of spindle-oil, heating will follow because the oil is too heavy to spread over the bearing-surfaces, owing to the high speed at which the spindles operate. The fluid friction, also, will be excessive.

When hand-oiling is employed, bearings will overheat if the application of oil is not sufficiently frequent or regular. When drop-feed oiling is employed, many hot bearings can be traced to empty lubricators, particularly when the oil-containers are of small capacity. Sometimes bearings heat because the oil congeals in the lubricator or in the feed-pipes and fails to reach the bearings. Parts of the lubricator, or the oil-feed pipes from the lubricator to the bearings, may become choked with deposits which may cause sufficient reduction in the oil-feed to produce hot bearings. Cotton waste, still largely used for cleaning engines and machinery, should never be used for this purpose, as fine fluffy matter from the waste gets into the lubricators and oil, causing trouble. Muslin or silk cloths are much to be preferred, as they are free from fluffy matter and can readily be cleaned.

Obstructions in lubricators and oil-feed pipes often cause heating of bearings.

Another source of trouble is the escape of oil between the bearing-housing and the bearing-brass. With a liberal oil-feed, the bearing will give no trouble, but when even a small reduction in the oil-feed is attempted the bearing will heat, as only the surplus oil has been reaching the bearing itself.

Long bearings sometimes give trouble if they have too few oil inlets. For instance, a bearing more than 12 in. long with only one drop-feed oil inlet at the centre is likely to be a trouble-maker. Some bearings are hard to lubricate because the shaft-pressure is upward instead of downward. This makes it difficult for the oil to spread, unless it is introduced at the bottom of the bearing and there is provision made to prevent its too free escape.

In some ring-oiled bearings, water of condensation from steam or a moist atmosphere enters and accumulates in the bottom of the bearings. The water gradually floats the oil from the bearing, until finally the oil-rings revolve in water and heating occurs. In ring-oiled bearings, deposits formed by the oil itself or by impurities entering the bearing may cause the oil-rings to stick, so that they fail to revolve, the oil-supply fails, and the bearing heats.

Bearings lubricated by the splash-oiling system may heat if the oil level is too low to provide adequate oil spray, or if the oil has become emulsified by water of condensation and cylinder-oil from leaking glands.

Water, either from the engine itself, such as condensed steam from leaking piston-rod glands, or from leaking cooling-water coils, etc., sometimes finds its way into the bearings and displaces the oil. The bearings commence to heat as soon as the oil film is destroyed by the water. Where the entrance of water cannot well be avoided, daily treatment of the oil is advisable.

Water and gummy deposits in bearings are frequent sources of trouble.

In circulation-oiling systems the oil-capacity should be large enough to permit cooling of the oil and thorough separation from impurities. Bearings may heat, due to deposits choking the oil-inlet pipes. Deposits may be due to unsuitable or improperly manufactured oil, or to the mixing of water and oil, or two different oils. If, for example, a heavily compounded oil gets into mineral oil in circulation, a large part of the compound will separate in the form of a sludge. If the oil has been a long time in circulation the addition of a large quantity of fresh oil may cause a dark-colored deposit to be precipitated. Oil-distributing grooves or oil-grooves in the bearings may be choked for one or other of the reasons already given and thus cause trouble by preventing the proper distribution of the oil.

'Speeding-up' of machinery in order to increase the production may cause heating. Obviously, higher speed will produce greater friction and may demand the selection of a quicker-acting or higher-quality oil to give good results. If the load on an engine is increased, it is not unusual to find that some of the bearings are unable to stand the increased strain, and therefore heat.

*From 'Bearings and Their Lubrication', issued by the Vacuum Oil Company.

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Excessive strains in the bearings may also be produced by settlement of building foundations, which throws the bearings out of alignment. Excessive vibration may produce similar results.

Light load on a steam-engine may cause heating of the crank-pin bearing, for when there is an insufficient quantity of steam in the cylinder properly to cushion the movement of the heavy piston, the crank-pin is subjected to excessive pounding. Eccentric-straps may heat as a result of poor internal lubrication, which increases the resistance to be overcome in moving the steam or exhaust valves. Driving belts and ropes must be shortened after they become slack. If they are shortened too much, they produce excessive pressure on the bearings supporting the pulleys over which the belts or ropes run. Increased temperature will thin the oil, so that it may not be able to withstand high bearing-pressures.

Excessive load on an electric motor or an unbalanced construction or imperfect adjustment will cause high temperature in the motor. The extra heat thus conducted into the bearings may cause the oil film to break down, a condition indicated by excessive heating.

With many classes of rough machinery, it is still common practice to replace bearings without any attention to scraping them in with the shafts. In fact, the bearings are allowed to 'run themselves in'. Considerable heat develops and a liberal feed of heavy-bodied oil is necessary during the first few days. Needless to say, this is a crude and undesirable practice.

When a bearing has been excessively hot, the bearing-brasses warp, and the edges of the brass close against and nip the shaft. Here, it is necessary to file away these corners of the brass and chamfer the edges so as to facilitate the entrance of the oil.

Cracked bearing-brasses allow the oil to leak away. The oil film is destroyed, and even with a liberal oil-feed the bearing will be 'sensitive' and inclined to heat. Too soft white metal frequently leads to heated bearings. It yields too readily to pressure and slowly flows out of the bearing, so that the bearing surface constantly changes and never assumes a good working-skin. Too hard bearing-metal not properly fitted frequently causes heating, because the bearing-pressures are not uniformly distributed over the surfaces.

The character of the bearing-metal and the condition of the surfaces affect lubricating conditions.

The re-babbitting of a bearing should be done in one pouring. If done in two pourings, the white metal already in the bearing will have partly solidified and will not be properly incorporated with the metal of the second pouring. The result will be that cracks will develop in operation and the white metal will break loose. This will also occur when the white metal has been poured too cold, in which case it will not adhere closely to the shell.

After re-babbitting a bearing, it should be scraped to a correct fit, the bearing-edges should be rounded and all necessary oil-holes and distributing grooves made properly. Neglect of these precautions will cause heating of the bearing. If appreciable wear takes place, the edges of the oil-grooves become sharp and act as oil-scrapers rather than oil-distributors. The edges must be kept well rounded and the oil-grooves should, therefore, occasionally be examined, particularly if trouble has occurred.

When worn bearing-brasses have been replaced, the bearings sometimes heat because the new brasses have not been properly fitted and scraped together. If the bearing clearance is too small, through too close adjustment, heating will occur, as there is insufficient room for the oil to spread and form a satisfactory film. If the adjustment of a bearing is too loose, the oil will escape from the bearing too freely. In the case of bearings such as crank-pin bearings, which are subjected to intermittent heavy pressures, the oil will be unable to provide a sufficient cushion to prevent metallic contact. Pounding or knocking of the bearing will cause heating and wear.

When starting after a stoppage, say, over Sunday, the power necessary to drive the mill or works is always considerably higher than normal. All of the bearings have cooled and the oil throughout is cold and sluggish. As the oil heats and the various driving belts and ropes become more flexible, the load gradually decreases to normal. When engines and machinery have been shut down for a longer period, special attention should be given to the lubricators and lubrication of all parts before commencing operation. Driving belts and ropes are stiff after the long standstill, and it must not be expected that the speed of the plant can be quickly increased to normal without trouble.

Excessive deflection in a shaft, due to various causes, will cause overheating of the nearest supporting bearings. The shaft will bear more heavily on one side of the bearing and the heat will develop and spread from that point.

Where oils of vegetable or animal character or heavily compounded oils have been in use and where the new oil introduced is straight mineral, or nearly so, the change should take place gradually. Vegetable and animal oils leave a sticky varnish or rubber-like coating on bearing-surfaces and in the oil-pipes. If the change is made quickly, heating is bound to occur and sometimes even seizure of the bearing-surfaces. This is because the coating is loosened in lumps or flakes by the new oil, which prevents the formation of a proper oil film. The best practice in adopting a straight mineral oil after a compounded or animal oil has been used is to introduce the mineral oil gradually as follows: for the first two weeks a mixture of 75% of the former oil and 25% of the mineral oil; in the succeeding two weeks a mixture of 50% of each of the oils; the following two weeks a mixture of 25% of the oil formerly in use and 75% of the mineral oil. In this way the gummy coating is gradually loosened and worked out of the bearing, and mineral oil may be subsequently used without any danger of overheating.

When a change is made in the oil used, this should be done gradually.

Nearly always when introducing a new oil, which is appreciably different in character from the oil previously used, some bearings will heat. This may be due to the better quality of the new oil dissolving deposits produced

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by the old oil. The deposits when loosened too quickly cause trouble, acting in the same way as grit or dirt. It takes time for the bearing-surfaces to adapt themselves to the new oil. The use of a grease containing dirt (which is not visible as in oil) and graphite tends to choke oil-pipes and oil-grooves and is often responsible for heated bearings.

Small bearings are usually easy to cool, as the total amount of heat present in the bearings is relatively small. Usually a liberal supply of the regular oil is all that is required. If the bearing is heated to such an extent that it has been distorted or the white metal has started to flow, it must be dismantled and put in thorough working-order.

When large bearings heat, the problem is different. Such bearings may absorb and contain a great deal of heat. When once a large journal starts to heat and expand, there is relatively so little clearance that the oil film is easily squeezed out and the bearings may seize. The first thing to do when a large bearing heats is to increase the bearing-clearance by loosening the bearing-brasses. If the bearing has not seized, but is extremely hot, it may be lubricated liberally with steam-cylinder oil (which possesses superior lubricating properties under high temperatures) until the bearing cools, when the normal practice of oiling the bearing can be resumed gradually. If the bearing has commenced to seize, a little graphite, sulphur, white lead, or like ingredients, mixed with the cylinder-oil, may be used to advantage.

Castor oil or rapeseed oil are occasionally employed for cooling bearings, but their use should be avoided, because where a circulation system is employed they mix with the engine-oil and afterward develop deposits. Once a bearing has become accustomed to the use of such oils it is not always a simple matter to change back to the original conditions. In case a hot bearing develops, seizure of the overheated shaft may take place if water is applied direct to the bearing, on account of sudden shrinkage. If its use is necessary it should, therefore, be applied to the shaft near the bearing.

Iron-Ore Resources of the World

Any attempt to estimate the world's iron-ore resources, says F. H. Hatch in the Trade Supplement of the London 'Times', is complicated both by the diversity of the products manufactured from the raw material and by the numerous factors that go to connote a commercial iron ore. Among these the iron content, the presence of beneficial or deleterious constituents, physical condition, geographical position, and means of transportation are all considerations of the first importance.

First, there is the iron content. It is estimated that the crust of the earth contains 4.4% of metallic iron, of which only a minute fraction has been sufficiently concentrated by geological agencies to form commercially available iron ores; for one ton of these that contain 60% of iron there are many tons that contain 50%, while for one ton that contains 40% there are vastly many more that contain 30%, and so on. The amount of reserves in an iron-ore field can therefore be indefinitely increased by lowering the grade of the material to be included.

With regard to the presence of beneficial or of deleterious constituents, what is prejudicial in one case is beneficial in another. If hematite pig-iron for the acid process of steel making is required, low phosphorus is demanded; if, on the other hand, the iron is destined for the basic process, high phosphorus is wanted. Titanium rules out vast bodies of ore containing a large proportion of iron because the presence of titanic acid in any considerable amount raises the temperature of fusion and leads to greater fuel consumption and a heavier blast. A small quantity of manganese, on the other hand, is beneficial, since it helps to get rid of sulphur. A high silica content is objectionable because of the limestone that has to be added to the charge to neutralize the acid, thereby reducing the output per furnace and increasing the cost per ton of pig; but a calcareous ore is sought after, since it is either self-fluxing or can, if the lime is present in excess, be mixed with silicious ores in the proportion required for a fusible charge.

The physical condition of the ore is of the highest importance. If the ore is friable, disintegrates during transportation, and arrives at the smelting works in a dusty condition, or if it 'decrepitates' when heated, it chokes the furnace, prevents the free passage of the gases, and leads to dust losses. Although friable ore can be improved by sintering or nodulizing, this can be done only at a heavy increase in the cost of production. On the other hand, a hard, dense ore, such as certain classes of magnetite, is refractory and consequently not favored by the ironmaster, except for enriching purposes.

Summarizing the estimates for the great ore districts that have been at least partly developed (namely, the United States, Cuba, Newfoundland, Brazil, Scandinavia, Central Europe, the United Kingdom, Spain, and North Africa), we arrive at the following round figures: High-grade low-phosphorus ores, 6,740,000,000 tons; high-grade phosphoric ores, 6,460,000,000 tons; low-grade ores, 17,100,000,000 tons; total, 30,300,000,000 tons.

Another 1,500,000,000 should be added for the less important districts of Russia, Austria, Greece, Chile, Venezuela, Mexico, and Canada, making a grand total of 31,800,000,000 tons, of which the equivalent iron is 14,310,000,000 tons, or, on the basis of a pig-iron production of 70,000,000 tons per year, sufficient to last over 200 years.

The resources of the continents of Africa, Asia, and Australia are unknown, but important deposits exist in South Africa, Australia, and India, and others are known, for instance, in China, Korea, and Japan. Moreover, having regard to the large unexplored areas of these continents, the existence of great reserves as yet undiscovered is probable. On the whole, adequate iron-ore supplies seem reasonably secure for a remote future.

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INDUSTRIAL EQUIPMENT

THE NEWTON CONTINUOUS MILLING MACHINE

A continuous milling machine of the table type, developed by the Newton Machine Tool Works, Inc., of Philadelphia, is shown in Fig. 1. The column and base are cast integral in order that strains from bolted joints may be obviated and rigidity obtained. The table is circular, with special provision for mounting holding-devices. It is adjustable upon the base to provide for the proper placing of the jigs carrying the work in relation to the cutters, in order that the work may be placed upon the smallest possible radius, and utilize the least possible diameter of cutter. Production on a milling machine is largely controlled by the number of pieces removed per revolution of the table; hence, it is essential that these be placed with the least space between them.

The tables are furnished 24, 36, and 48 in. diam. on the working-surface, in addition to which they are surrounded

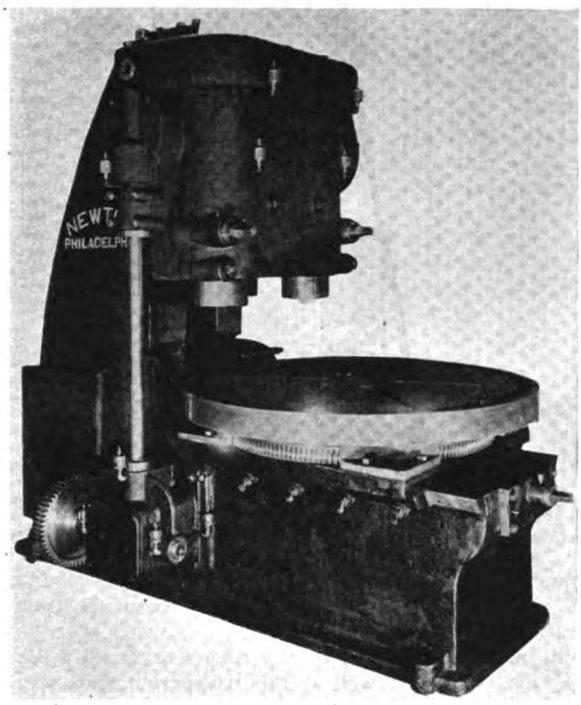

Fig. 1. The Newton Continuous Milling Machine

by a pan for draining the lubricant when working on steel. The rotative movement of the table is controlled by a fixed feed, so that there is no possibility of the operator increasing or decreasing the production of the machine. There is, however, a provision in the feed-mechanism by which the rate of feed can be increased or decreased by those in authority. The spindle-head is equipped with two spindles, each of which is individually adjustable for setting the cutters to gauge. The left-hand spindle is used for the roughing operation, and the right-hand spindle for finishing.

The distance between centres of these spindles varies from 22½ in. on the largest machine to 13 in. on the smallest machine, so that long pieces can be machined with the roughing operation complete before the finishing cutter starts on the same piece. This is probably the most accurate method of machining parts in quantities, because any wear, or any vibration in the machining occurring, due to inequality of castings, is absorbed in the finishing operation, and owing to the small amount of work to be performed by the finishing-cutter, accuracy of both finish and dimension are maintained with infrequent grindings of both the cutters required, due to this condition. Furthermore, the ability to obtain accuracy with the finishing spindle permits running at high cutting-speeds and feeds.

The speeds of the spindles are controlled in the same manner as the feed described above. The housing or head carrying the spindles is adjustable on the column, and this again is a necessary element of this type of machine, in order

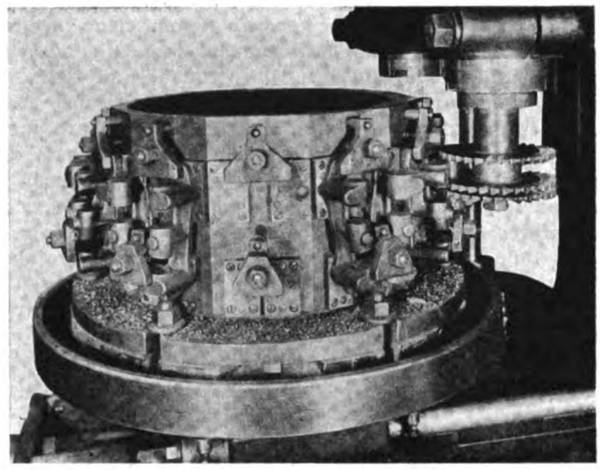

Fig. 2. Facing Bosses on a Bracket

that the holding-device may set as flat or low to the table as the casting will permit. The adjustment of the head downward provides for the minimum extension of overhang to the cutter and spindle; whereas, if this head were a rigid frame having a fixed distance above the table, it would be necessary to build a jig into the air in order to bring the work to the cutters. As the work revolves, it presents a constantly changing angle to the cutter; thereby providing the benefits of the shearing action and preventing the flat

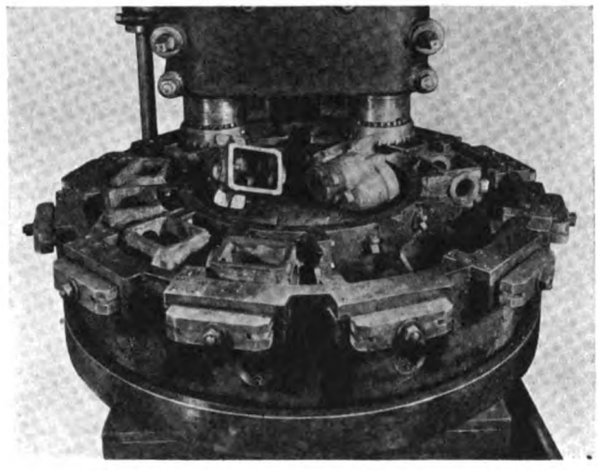

Fig. 3. Milling Malleable-Iron Automobile Casting

heavy cutting which is obtained by operations maintained on a straight line.

All driving-gears are hardened and enclosed, and run in oil.

Fig. 2 shows the method of facing the bosses on a bracket. There are six faces to be machined, three of which are on one line, and three on another line, at an angle to the first, so that two operations are required to complete this piece. At a feed of only 4 in. per minute, a production of thirty pieces per hour is obtained. Greater production could be obtained if required.

Fig. 3 shows the fixtures and arrangement for milling a malleable-iron piece, 100 of which are produced per hour.

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AIR-POWER AIDS WOOD-SHIP CONSTRUCTION*

By Arthur L. Schoenberg

Seventeen and one-half days from keel-laying to launching was attained by the Grays Harbor Motor Ship Corporation of Aberdeen, Washington, in building the 4000-ton wooden steamship 'Aberdeen'. The vessel was launched with superstructure 96% complete and auxiliary-machinery installation complete. Six days later, this vessel was completed and went to sea under her own steam. This yard also built the 'Abrigada', the first wooden steamship launched for the U. S. Shipping Board. Up to the close of 1918, this company had launched 14 vessels of the Ward type. These are 290 ft. overall, 49 ft. beam, 28.2 ft. molded depth, measuring 4000 dead weight tons. They are equipped with triple-expansion engines of 700 hp. each. Compressed air plays an important part in ship construction in the yard. Air-compressors at three different points supply approximately 3000 cu. ft. of free air per minute. There are about 500 three-quarter inch outlets from which are operated 75 pneumatic tools, including boring, drilling, and planing tools, and hammers. Air is also used for doing various odd jobs about the plant. Two miles of pipe and six miles of air-hose are required. The air-power plant includes one 16 by 9¾ by 12 628-ft. Sullivan WJ-3 angle compound compressor, which has given satisfactory service. As many as seven shipways were in use at the height of the Government wooden-ship program. The entire plant covers approximately ten acres of ground.

ELECTRIC-ARC FURNACE REGULATOR

High electrode-operating speed and precision of regulation are the important features of the electric-arc furnace regulator just placed upon the market by the Westinghouse Electric & Manufacturing Co. Speeds 2½ to 3 ft. per minute,

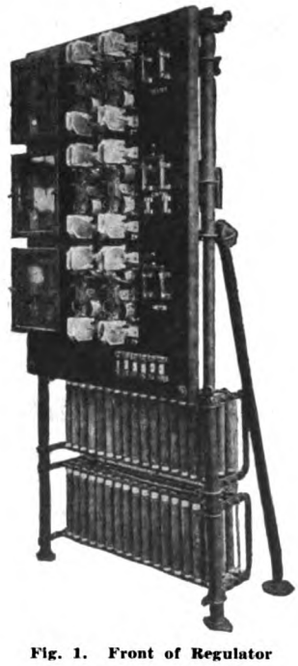

Fig. 1. Front of Regulator

depending upon the variation from normal, and 5% precision is claimed.

This regulator combines high speed with a narrow current-zone because the electrode speed tapers all the way from full to zero as the regulated current approaches its normal value. In other words, within certain limits the restoring speed is approximately proportional to the amount the current in the electrode deviates from normal. This permits the greatest possible electrode-speed for a given current variation. This feature is particularly appreciated during the melting of cold scrap. For small variations in current the speed is slow enough to prevent continuous breaking of the arc and at the same time, when the solid metal begins to cave into the pools of molten metal under the electrodes, sufficient speed is available to permit the regulator to extricate the electrode before the time-relay allows the breaker to trip. When the current is turned on a furnace charged with cold scrap, it is necessary only to throw the regulator-control to the automatic position. Regardless of the position of the electrodes at this time, the regulator will allow each one to run down at full speed until it touches the steel, when complete automatic regulation will

Fig. 2. Rear of Regulator

commence. It is impossible for an electrode to get into the steel, and practically no attention is required from the operating personnel.

One important feature of the regulator is its utilization of the arc-voltage as well as the arc-current to control the motors. This device prevents the electrodes getting into the steel under automatic regulation. Under-voltage relay-trips on the control-circuits are unnecessary. With any device actuated solely by the current, equal arc lengths cannot be maintained in the furnaces using two or more electrodes, particularly when operating at reduced power. In the regulator, the arc-voltage, as well as the electrode currents, are maintained balanced.

The voltage-coils also make the control of each electrode independent of the others in the surface. In fact, one electrode may be entirely withdrawn without disturbing any of the others. In a regulator dependent upon current-control exclusively, any movement of one of the electrodes causes the elements of all other electrodes to change their positions.

FREE TRIPS TO SULLIVAN PLANTS

It is now possible to see the actual operation and manufacture of Sullivan air-compressors, drills, and coal-cutters without the expense of a visit to the factory. Some months ago films were made with the assistance of the Rothacker Film Manufacturing Co. of Chicago showing the manufacturing processes and the actual use of the Sullivan machines in the field. The pictures show both the Chicago and Clare-

*From 'Mine and Quarry'.

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mont factories. Mining companies, engineering societies, or others who would be interested in showing these pictures to employees or members, may obtain this privilege at no expense to themselves, by writing to the advertising department of the Sullivan Machinery Company.

CATALOGUES HAVE INCREASED IN VALUE

Manufacturers and sales managers ought to sit up and take notice now of the national standard catalogue size recommended by the National Association of Purchasing Agents. The purchasing agents are now establishing standard files for the catalogues that will fit them, and 'misfit' files for those which because of their different size cannot be filed with the standard catalogues. The Dodge Manufacturing Co., Mishawaka, has discovered that it has accumulated over eight hundred catalogues which accommodate themselves to the standard file. E. L. Ogden, of Boston, who is purchasing agent for twenty-three gas and electric companies, has gone one step further and keeps the standard file, which contains about six hundred catalogues, in his own private office, while his misfit file is in an adjoining room. All manufacturers and dealers should have their catalogues in the files to which reference is most constantly made. The fact that 7½ by 10⅝ in., the National Standard catalogue size, accommodates itself to practically every industry accounts in a measure for its popularity. Manufacturers that formerly issued catalogues in other sizes have found it awkward to discard their old plates when printing new catalogues, but now that the day has arrived when the purchasing agents, engineers, master mechanics, and others are installing special standard files, the sales value of the catalogue comes more than ever to the front in determining the matter of size.

NEW RUST REMOVER

For removing rust and other foreign matter from machinery and other metal surfaces, Peter A. Frasse & Co., 417 Canal street, New York, have developed Meno Rust Remover and Cleanser. It is claimed that the cleansing effect is the result of electro-chemical action produced by the cleanser, which loosens and dissolves rust, corrosion, grease, oil, dirt, carbon, paint, or any other foreign substance that is adhering to the metal irrespective of its age or hardness. This action automatically ceases when contact between the cleanser and the metal is established. There are two methods of using the preparation, as follows: (1) Apply it to the machine or part with a brush and allow it to remain for a short time, then brush or rub it off leaving the metal bright and clean. (2) Mix the preparation in a container with water, then attach the machine or parts to wire or chain so that they will hang in the solution. No further attention is required since the process of cleaning goes on while the parts are immersed. It is stated that the preparation will not burn or explode. The preparation is an economical one to use as the same solution may be used many times over since it does not deteriorate or lose its cleansing power.

Book Review

The Modern Electroplater. By Kenneth M. Coggeshall. Pp. 255, ill., index. Norman W. Henley Publishing Co., New York. For sale by 'Mining and Scientific Press'. Price, $3.

This is a practical treatise on the electroplating industry, which will be of value not only to the student and the apprentice, but also to the skilled craftsman. The first two chapters discuss briefly the history and the theoretical foundation of the process. Then follow several chapters on the various kinds of equipment used. Then comes a chapter devoted to plating methods and the standard solutions used for depositing the various metals. There is also a chapter on polishing, buffing, and lacquering, and one containing miscellaneous data and reference tables.

Trade Notes

R. C. Pettit has opened a machine-shop at 73 Germania street.

Steppat & Day have opened a machine and repair shop at 822 Ellis street.

The Shell Oil Co. will spend $2,500,000 in enlarging its refinery at Martinez.

Kendall & Darneille have opened an automobile-repair shop at 472 Turk street.

Burd & Mulholland have opened a machine and repair shop at 228 Hyde street.

Richardson & Welch have opened a machine and repair shop at 442 Natoma street.

The Southern Pacific Co. will spend $143,000 on increasing the warehouse facilities at its Sacramento shops.

The foundry of the **Bayside Iron Works,** of Everett, Washington, which was recently destroyed by fire, has been rebuilt.

The Ideal Tool & Die Works has opened a machine-shop at 208 Twelfth street and will specialize in tool and die work.

The Fidelity Trust & Savings Bank, of Fresno, will construct a 15-story office building at Mariposa and J streets, in that city.

Thomas F. Baxter, general manager for the **Holt Manufacturing Co.,** has been elected president of the Stockton Council of Boy Scouts.

A $100,000 manufacturing plant, including foundry, galvanizing-shop, and pattern-shop will be erected by the **Doud-MacFarlane Machine Co.** at Tacoma.

Cottage Grove, Oregon, will have an iron foundry in operation about the first week in November when **James Feeney,** formerly of Tillamook, opens his plant.

The Pioneer Motor Bearing Co., 501 Eddy street, is preparing to manufacture automobile bearings and expects to have its goods on the market about January 1.

W. N. Rieger has bought the outstanding interests in the **Rieger & Candee Iron Works** at Taft and will conduct the business hereafter under the name of the **Rieger Iron Works.**

The Electric Furnace Co., of Alliance, Ohio, has issued bulletin 9-B, a new catalogue describing the Baily electric furnaces, both for melting non-ferrous metals and for heat treating.

The United Iron Works, of Oakland, has bought the property at the corner of Second and Clay streets, comprising 5000 sq. ft. adjoining its present plant and will enlarge its facilities.

The Mullen Manufacturing Co., 64 Rausch street, is taking figures for re-building its plant, which was recently destroyed by fire. Plans were prepared by Alfred Kuhn, 833 Market street.

Dyer Bros. have been awarded the contract for erection of the steel work for the new Orpheum Junior theatre, Taylor and Market streets, which will require 1000 tons of structural steel.

The Westinghouse Electric & Manufacturing Co. has issued leaflet No. 3461, which describes and illustrates its automatic current-regulator for electric-arc furnaces with movable electrodes.

The latest issue of 'Autogenous Welding', the quarterly periodical published by the **Davis-Bouronville Co.,** contains a number of interesting articles pertaining to oxy-acetylene welding and cutting.

Fire destroyed the **Pacific Iron & Metal Co.'s** plant at

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Seventh and Howard streets, October 18. As the building contained mainly scrap-iron and other junk, the damage except to the building itself was small.

A hydro-electric plant will be built soon by the **Delhi Mining Co.** near Grass Valley. Two generators and other materials have been purchased. Most of the energy will be sold to the Pacific Gas & Electric Company.

The Star Auto Stage Co., of Stockton, one of the largest automobile stage companies in the State, plans to erect or buy a building at Stockton for a depot and general headquarters, including a machine and repair shop.

The Burness Auto Works has moved its shop to 12th and Everett streets, Portland. The business was originally established in 1904 by Burness & Martin, who were the pioneers in automobile sheet-metal work in Portland.

The Pacific Coast Brass Manufacturing Co., of Huntington Park, near Los Angeles, has been incorporated by W. F. Schultheiss, W. F. Schultheiss, Jr., and Frank James, to manufacture brass, bronze, and other metal products.

The Shartzer Illuminated Sign Co. has been organized by R. W. Shartzer, T. W. Gordon, C. D. De Mar, A. Massoni, and H. Shartzer, to manufacture illuminated signs and automobile-license plates. A factory will be built at Oakland.

Construction of a $6,000,000 terminal for the **Pacific Steamship Co.** on the site of the old No. 2 yard of the **Skinner & Eddy Shipbuilding Corporation** at Seattle is being considered by the U. S. Shipping Board, owner of the property.

The Patent Specialty Works and the **Rogers-Baker Machine Works**, both of Seattle, have been consolidated under the name of the **Patent Specialties Manufacturing Co.** The business will be conducted at the plant of the Rogers-Baker company.

The Western Wool Warehouse Co., of Portland, has been incorporated with a capital of $2,000,000. A site adjoining the American Marine Iron Works has been purchased and the first unit of the proposed warehouse will be started immediately.

The Metals & Minerals Co., recently incorporated with a capitalization of $200,000, has commenced work on a smelter, fronting on the Santa Fe right-of-way, Richmond. William R. Griffin, a Nevada mining man, heads the board of directors.

The Anacortes Iron Works, of Anacortes, Washington, has moved from 1011 Second street to Third and O streets. The company will continue its general line of forge work, and in addition will specialize in cannery coolers and fish-trap staples.

The Pacific Foundry Co. has purchased property at the corner of 19th and Treat streets and will shortly commence the erection of a building there with a floor area of about 35,000 sq. ft. The building will be used mainly for electric-furnace work.

The Judson Iron Works closed its Emeryville plant on October 19, posting a notice that when the plant re-opened, it would run open shop, on the so-called American plan. The plant resumed operations on this basis on October 27.

The New York office of the **National Engineering Co.**, manufacturer of the Simpson sand-mixer for foundry purposes, has been moved from 15 East 40th street to 248 Fulton street. This office is in charge of the Eastern sales manager, S. H. Cleland.

The Coast Equipment Co. has established offices in the Lewis building, Portland, in charge of Conway & McCalley. This is the fourth office of the company to be established on the Pacific Coast, all under the general charge of L. A. Somers, the others being at San Francisco, Seattle, and Los Angeles.

The Davis-Bournonville Co. has issued a circular on the Oxygraph, models No. 1-A and No. 2, showing some details of these mechanically operated cutting-torches together with examples of the various complicated shapes that have been cut with this equipment.

The Electric Furnace Construction Co., of Philadelphia, announces that Greaves-Etchells furnaces have been placed in operation at the Vancouver Engineering Works, of Vancouver, B. C., and at the plant of the Sullivan Machinery Co., at Claremont, New Hampshire.

Ditty Bros., Inc., have added used foundry equipment to the other lines carried by the firm. Their list of equipment now in stock includes a number of cranes, hoists, compressors, blowers, cupolas, ladles, and motors, as well as considerable miscellaneous apparatus.

The Co-operative Glass Co., of Los Angeles, has been organized by William C. Blank, M. L. Haines, W. Trevor, and George S. Reeves to manufacture flint-glass and glass bottles. A plant costing approximately $1,000,000 is to be built near Avenue 35 and Pasadena avenue.

The North Pacific Steel Co., Seattle, has acquired the plant and the process of L. G. Casey for the production of pig-iron and of gray-iron castings direct from the ore. The company has also bought the Dean Channel mine in British Columbia. One furnace has already been constructed and is in operation.

The Bastian-Blessing Co., of Chicago, has issued catalogue No. 20, describing the Rego cutting and welding apparatus manufactured by the company. Detailed descriptions are given of the various torches and regulators, discussing not only the construction features but also the principles of operation.

The Walworth Manufacturing Co. has issued Export Catalogue No. 35 in English, French, Spanish, and Portuguese. It comprises about 400 well-illustrated pages, and lists and describes the valves, fittings, and tools for steam, water, gas, oil, and air manufactured by the company including the Walworth Stillson wrench and the Kewanee union.

The Portland Vegetable Oil Mills Co., which was formed a few months ago because of the removal of the Palmolive Co.'s operations to San Francisco after its Portland plant burned, has been capitalized at $500,000, and $200,000 worth of stock has been offered for general subscription. The plant of the new company will be on the Willamette river.

The Barde Industrial Corporation, which bought the entire equipment of the Skinner & Eddy yard at Seattle and also a large amount of equipment from the Emergency Fleet Corporation, has opened a branch office at 625 Market street, in charge of William N. Voegtly, Jr. The parent organization is M. Barde & Sons, Inc., mill and loggers' supplies, Portland, and affiliated with the two companies is the Barde Steel Products Corporation of New York.

The Whiting Foundry Equipment Co., of Harvey, Illinois, has issued an illustrated 50-page booklet in heavy paper covers entitled 'Foundries: Their Complete Equipment'. Although it is devoted mainly to the equipment manufactured by the Whiting company, the booklet is practically a condensed treatise on modern foundry equipment and design.

Application has been made at the county clerk's office, Oakland, for letters of incorporation by the **Lloyd Manufacturing Co.**, capitalized at $150,000. The headquarters of the company will be at Berkeley. Automobile accessories, parts, and mechanical devices of all kinds may be manufactured. Z. P. Lloyd, Berkeley, heads the board of directors.

The Matteson Manufacturing Co. has been organized by W. C. Matteson, Ralph Lucas, A. V. Keyes, F. B. Putnam, and L. Smallpage, of Stockton, to manufacture a tractor of the track-layer type, developed by Mr. Matteson. A 15-acre site has been bought on West lane at Stockton, and work will be started about January 1 on a $150,000 factory building.

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The Kellenberger Sales Co., of Spokane, has been organized to handle the Kellenberger transmission for Ford automobiles. The directors are G. B. Kemp, M. S. Higgins, H. G. Twomey, and R. S. McClintock, all of Spokane. The transmissions, which provide for four speeds forward and two reverse, are being manufactured by the **Western Gear Co.**, of Seattle.

A. L. Becker, consulting marine engineer, has opened offices in the Alaska Commercial building. Mr. Becker was formerly with the Craig Shipbuilding Co., of Toledo, and came to California with Mr. Craig when the latter established his plant at Long Beach. During the War, Mr. Becker was connected with the Schaw-Batcher yard at South San Francisco.

The Metals & Chemicals Extraction Corporation, of Oakland, which, through its subsidiary corporation, the **National Graphite Co.**, controls graphite properties in Mexico, has arranged with **Ditty Bros., Inc.**, for the latter firm to take entire charge of the selling of its graphite to the foundry trade. This adds another line to those already handled by **Ditty Bros., Inc.**

The August issue of 'General Fireproofing', issued by the **General Fireproofing Co.**, of Youngstown, Ohio, is devoted to the activities of the Associated Metal Lath Manufacturers, Inc. Of particular interest is the article by W. B. Turner, president of the Associated Metal Lath Manufacturers, Inc., describing particularly the research work done by the organization.

Harry W. Gallet announces the removal of his headquarters to 622 Golden Gate avenue, where, in addition to his iron and steel domestic and export brokerage business, he is now handling the following lines: North American gas-electric torches and blowers, Federal welding and cutting outfits, and National Chapman lifting-truck. With Mr. Gallet is associated Harry E. Mechling.

The Milton Development Co., of Portland, has been organized to develop the iron-ore deposits along the Columbia river near Scappoose and Columbia City, Oregon. Samples of the ore show an iron content ranging from 49 to 58%. About 100,000 tons of ore has already been blocked out, with the probability that a considerably larger amount could be obtained. C. A. Finley and H. A. Heppner are interested.

The Los Angeles Shipbuilding & Dry Dock Co. has arranged to offer, through a syndicate of Los Angeles bankers, $1,250,000 worth of first-mortgage serial 8% bonds, maturities ranging from September 1, 1921, to September 1, 1930. The company was organized in April 1917 and to date has completed 28 ships, 27 of which were for the U. S. Shipping Board. Besides the ships themselves, the company manufactures the main engines and most of the auxiliary machinery.

The National Engineering Co., of Chicago, has recently issued circular No. 60, describing the Simpson bucket-loader, which is designed for use with the Simpson foundry-sand mixer, and with other machines where mechanical loading is desired. Frequently such a charging apparatus not only ensures the correct amount of material being fed into the machine, but also reduces the cost as compared with loading by hand.

If the plans of the **Six-Minute Ferry Co.**, of Vallejo, which now operates a ferry between Vallejo and Mare Island and also one between South Vallejo and Valona, for an automobile-ferry system between San Francisco and the Oakland waterfront near the Albers mill are carried to completion, a shipyard will be established at Vallejo to construct the necessary ferry-boats. At least three steel vessels will be constructed, each with a capacity of 100 automobiles.

A. G. Wishon, general manager for the San Joaquin Light & Power Corporation, has announced that the completion of the Kerckhoff plant and of the new steam-plant now under construction in Kern county will make it possible for the company to supply energy to the more than 3000 prospective agricultural consumers now on the waiting list before the opening of the pumping season of 1921. Most, if not all, of these consumers will be in the market for pumping equipment.

Elmer E. Cox, of San Francisco, coast representative of the syndicate that controls the Weed Lumber Co. and the Madera Sugar Pine Lumber Co., has purchased the holdings of the White & Friant Lumber Co., comprising 12,000 acres near Crane valley and about 100 miles north-east of Fresno. A mill is to be built at a point as yet undecided, but it will probably be either at Fresno or Friant. Logging the tract will presumably require the construction of a railroad from Friant, about 60 miles.

The Standard Drop Forge Co. is offering 3000 shares of preferred stock at $100 per share, the proceeds to be used to build and equip a modern drop-forge plant in the Bay district. The board of directors comprises E. I. de Laveaga, president; C. L. Froding, vice-president; F. G. Page, secretary; W. D. Cole, J. A. Moore, W. W. Johnston, and Clarence Johnston. Besides its drop-forging operations, the company has an option on the district rights to the calorizing process for protecting metals from corrosion.

The Link-Belt Co., 910 S. Michigan Ave., Chicago, recently published an illustrated and attractive 24-page book covering its Traveling Water-Screens. This publication will be sent to anyone interested in the effective and economical screening of condensing water. Surface-condensers are easily clogged by trash contained in the water supply, and are hard to clean. Clogged condenser-tubes mean reduced efficiency of operation and other disadvantages that can be forestalled by the use of traveling screens.

The Steel Mill & Foundry Supply Co. has been organized, with a capitalization of $1,000,000, to buy and sell scrap iron and steel and other mill and foundry supplies. Offices will be established in the Cunard building. The principal stockholders are the various steel mills of the San Francisco and Los Angeles district, including the Pacific Coast Steel Co., Columbia Steel Co., Judson Manufacturing Co., Llewellyn Iron Works, and Southern California Iron & Steel Co., each of which concerns is represented on the directorate.

The Goodell-Pratt Co., of Greenfield, Massachusetts, has issued catalogue No. 14, which shows more than 2100 tools for carpenters, machinists, and automobile repairmen, including 150 new tools that have not been listed before. These tools are all made directly from the raw materials in the company's factory. The catalogue consists of 464 pages, 6 by 9 in., printed in two colors on heavy paper, and with 700 illustrations. It is indexed and cross-indexed very carefully. The company also issues catalogues in French, Spanish, Russian, and Italian.

Through the courtesy of Captain E. L. Beach, Commandant of the Mare Island Navy Yard, members of the **San Francisco Section** of the **American Society of Mechanical Engineers**, together with other local sections of the National engineering societies and their friends, will take a trip to the Navy Yard on November 4. The excursion will be particularly interesting because of the opportunity to inspect the battleship 'California', now nearing completion. The trip is also planned in celebration of the 40th anniversary of the founding of the American Society of Mechanical Engineers.

The Pacific Aluminum Co., of Fresno, which started operations about August 1 making the 'Lustro' brand of aluminum cooking-utensils, has bought a factory-site in the suburbs of the town and has commenced the construction of a $50,000 building, the first unit of a proposed $150,000 plant. About 50 men will be employed when the first unit is completed. This will include a foundry as well as a plant for spinning and stamping. The officers of the company are T. M. Fitzgerald, president; E. J. Fitzgerald, vice-president

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and general manager; H. C. Friesner, secretary and manager of the manufacturing department; and J. H. Peddrift, treasurer.

The City Commission of Sacramento has rejected all bids for the general construction of the first unit of the municipal water-filtration plant. The lowest bid was about $1,500,000, while the engineer's estimate was $1,103,178. The consulting engineers for the Commission have recommended the acceptance of the following bids for supplying part of the equipment: Transformers to **Latourette-Fical Co.**, Sacramento, for $22,048. Motors to **Latourette-Fical Co.** for $49,690. Crane to **Cyclops Iron Works**, San Francisco, for $12,500. Centrifugal pumps to **J. L. Lawrence** and **E. P. Crowe**, San Francisco, for $65,789. It is probable that the general contract will finally be awarded on a cost-plus basis.

Only four bids, none of them for the entire stock, were received by the U. S. Shipping Board for supplies and stores at various places on the Pacific Coast. **Charles Nelson Co.** bid $90,000 for 18 wooden hulls at the Liberty yard at Alameda, and 25% of the total appraised value of $1,500,000 for yard materials in the San Francisco Bay and Los Angeles districts. **H. P. Davis**, of Portland, bid 15% of the appraised value of $1,500,000 for all property in the Portland district. **M. Glickman & Co.**, of Portland, bid 43% of the appraised value of all materials, exclusive of hulls, held on the Pacific Coast. This bid was informal and will be rejected. The **Alaska Junk Co.** bid $241,050.60 for the Portland properties. The **Barde Industrial Corporation**, which was the only bidder when these properties were offered first, and which then presented a bid for the entire stock, made no offer this time.

The Johnson Gear Co. of San Francisco is erecting a modern manufacturing plant at Berkeley. The present unit is 200 by 200 ft. The building has concrete side-walls and saw-tooth roof so arranged to give ample lighting. For the comfort of the employees modern washrooms, locker space, and cafeteria are provided. The company is manufacturing truck transmissions and gear-sets and requires increased space and tool capacity. The decision to move its plant from San Francisco to Berkeley was made after an exhaustive survey of localities in this district best suited for manufacturing. New automatic machines will be installed in the new plant which in conjunction with its present special equipment gives promise of making it one of the largest plants on the Pacific Coast, specializing in gears and other manufactured products. Suitable sales offices will be maintained in San Francisco when the plant is moved to Berkeley, on or about December 15, 1920.

The Kroyer Motors Co., of Stockton, has been organized by J. M. Kroyer and associates to manufacture the Wizard 4-pull tractor developed by Mr. Kroyer. The company acquires the patents and trade-marks held by Mr. Kroyer as well as the holdings of the Kroyer Manufacturing Co. An issue of $1,250,000 in preferred stock at $100 per share has been authorized, together with 37,500 shares of common stock of no fixed par value, 12,500 shares of which will be given as a bonus, share for share, with the preferred stock, and the remainder has been issued in exchange for developments, patents, and trade-marks. Of the preferred stock, $350,000 has been subscribed by Mr. Kroyer and associates, and the remainder is being sold by popular subscription. The factory will be built on a 30-acre site near the city limits of Stockton. Contracts are being let for construction of the first year's output in other plants, pending the completion of the factory. The tractor will be equipped with a 30-hp. motor, has two speeds forward and one reverse, and is controlled in a similar manner to an automobile. Power is applied by gears from the drive-shaft to the front wheels, and thence by chain to the rear wheels.

The B & C Machinery Co., operating a factory for the manufacture of canning machinery at Hayward, has been reorganized with a capitalization of $5,000,000 under the name of the **Berger, Fleming & Brown Co.** The company has purchased the controlling interest in the **National Axle Corporation** and will move its Hayward plant to San Jose, where a building will be erected on a site adjacent to the factory of the National Axle Corporation, now under construction. These changes do not affect directly either the **Berger & Carter Co.** or its affiliated concern in the machine-tool field, the **Pacific Tool & Supply Co.** The officers of the various companies are as follows: Berger & Carter Co., Otto E. Berger, president and chairman of the board of directors; W. W. Fleming, vice-president and secretary; Edward W. Brown, treasurer. Berger, Fleming & Brown Co., W. W. Fleming, president and general manager; E. W. Brown, vice-president and treasurer; Otto E. Berger, chairman of the board of directors. National Axle Corporation, E. W. Brown, president and treasurer; W. W. Fleming, vice-president and general manager; Otto E. Berger, chairman of the board of directors. Besides its line of canning machinery as made at present, the Berger, Fleming & Brown Co. will, when the move to San Jose is made, engage in the manufacture of dehydrators, having bought the rights in the Wonder dehydrator and also what are known as the Hammond patents. This department will be in charge of R. W. King, formerly president of the Caladero Products Co., of Atascadero, who brings with him his assistant at that plant, Robert Rea. The Caladero plant is one of the largest dehydrating plants in the world. At the National Axle Corporation, which will manufacture axles and other automobile hardware, S. C. Kyle will be in charge of production and H. W. Smith will be chief engineer. Reuter Bros., of Hayward, will also move their boiler-shop and foundry from Hayward to a site adjoining the National Axle and the Berger company plants. These three plants will all be situated on the 12-acre tract formerly called Luna park, and recently named Industrial City. It is estimated that the three together will employ about 350 men.

Obituary

Patrick Noble, president of the Pacific Rolling Mill Co. and a resident of California since 1868, died at his home in San Francisco on October 2.

Alexander J. McCone, one of the founders of Harron, Rickard & McCone, died at a hospital in Los Angeles on October 27. He was the founder of the Nevada Engineering Works, at Reno, Nevada, with a branch office at Los Angeles. Since 1905 he had resided at Los Angeles, discontinuing the Reno office, and calling the firm the Fulton Engine Works, of which he was president at the time of his death. He came to San Francisco in 1917, and in January of this year he returned to Los Angeles.

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